

THE VIRGIN ISLANDS COMPREHENSIVE LAND AND WATER USE PLAN
DEVELOPMENT PLAN

Prepared by the Division of Comprehensive and Coastal Zone Planning of the V. I. Department of Planning and Natural Resources in consultation with Strategic Planning Group of Jacksonville, Florida.

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TABLE OF CONTENTS

FOREWORD	i
INTRODUCTION	1

PART I: PLAN RATIONALE

WHAT DO WE HAVE?

Infrastructure Deficiencies	4
Lack of Affordable Housing	6
Environmental Degradation	7

WHAT DO WE WANT?

Availability of Public Facilities and Services	12
Potable Water and Sanitary Sewer Service Areas	13
Adequate Roadways and Mass Transit Service Areas	15
Environmentally Sensitive Lands	17
Steep Slopes	19
Floodplains	22
Shorelines	24
Beaches	25
Coral Reefs	25
Seagrass Beds	26
Mangroves	27
Salt Ponds	29
Agriculturally Suitable Lands	32
Groundwater Resources	34
Areas of Particular Concerns\Areas for Preservation and Restoration	37

HOW DO WE GET WHAT WE WANT?

Approach	40
Planning Framework	42
Intensity Districts	42
District A: Agriculture	43
District 1: Conservation	43
District 2: Low Density	43
District 3: Moderate Density	43
District 4: High Density	43
District 5: Urban	44
District 6: Industrial	44
District 1W: Waterfront Conservation	44
District 2W: Waterfront--Low Density	44
District 3W: Waterfront--Moderate Density	44
District 4W: Waterfront--High Density	44
District 6W: Waterfront Industrial	44

PART II: LAND AND WATER USE PLAN

ST. THOMAS LAND AND WATER USE PLAN

Existing Land Use Patterns	46
Land Demand Analysis	49
Public Participation and the Planning Process	59
Assumptions	63
Preferred Concept: Town Center	63
Application of the Concept to St. Thomas	66

ST. JOHN LAND AND WATER USE PLAN

Existing Land Use Patterns	69
Land Demand Analysis	71
Public Participation and The Planning Process	77
Assumptions	80
Application of the Concept to St. John	82

ST. CROIX LAND AND WATER USE PLAN

Existing Land Use Patterns	84
Land Demand Analysis	86
Public Participation and The Planning Process	96
Assumptions	99
Preferred Concept: Town Center	99
Application of the Concept to St. Croix	102

PART III: ALTERNATIVE GROWTH MANAGEMENT STRATEGIES

Introduction	107
Growth Management Tools and Techniques	110
Land Use Regulations	112
Public Spending and Taxing Policies	124
Land Acquisition	130
Private Voluntary Land Protection Techniques	134
The Recommended Growth Management Approach	136
Performance-Based Intensity Districts	139
Intensity Districts	139
Performance Standards	151
Plan Implementation	151
Comparison of the Old Zoning Code with the New Virgin Islands Development Law	152
Comparison of Uses Permitted in the Current Zoning Code with the Proposed Virgin Islands Development Law	154
Putting It Together - How the Performance-Based System Works	155
Administration of the Process	166

BIBLIOGRAPHY	172
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APPENDICES

APPENDIX A:
 Relevant Excerpts From Policy Guidelines 188
 APPENDIX B:
 Areas of Particular Concerns 196
APPENDIX C:
 Matrics of Comparative Uses in Current and
 Proposed Zoning Districts. 213

LIST OF TABLES

Table 1	Resident Population Projections, St. Thomas: 1991 - 2000	50
Table 2	Current Acreage/Population Relationships by Land Use Type, St. Thomas	51
Table 3	Projected Peak Daily Seasonal Population, St. Thomas: 1991 - 2000	52
Table 4	Hotel/Seasonal Unit Projects Approved or Application Pending, St. Thomas	52
Table 5	Commercial Projects Approved or Application Pending, St. Thomas	53
Table 6	Estimated Dwelling Units by Density Type, St. Thomas: 1990	56
Table 7	Estimated Dwelling Units Demand by Density Type, St. Thomas: 1991 - 2000	57
Table 8	Estimated Residential Needs by Density Type, St. Thomas: 1991 - 2000	58
Table 9	Planning District Population Growth, St. Thomas: 1980-1990 and Projected Population for 2000	58
Table 10	Relative Impact of Planning Process, St. Thomas	60
Table 11	Resident Population Projections, St. John: 1991 - 2000	72
Table 12	Current Acreage/Population Relationships by Land Use Type	73
Table 13	Projected Peak Daily Seasonal Population, St. John: 1991 - 2000	73
Table 14	Hotel/Seasonal Unit Projects Approved or Application Pending, St. John	74
Table 15	Estimated Dwelling Units by Density Type, St. John: 1990	75
Table 16	Estimated Dwelling Units by Density Type, St. John: 1991-2000	76
Table 17	Estimated Residential Needs by Density Type, St. John: 1991-2000	77
Table 18	Planning District Population Growth, St. John: 1980-1990 and Projected Population for 2000	77
Table 19	Relative Impact of Planning Process, St. John	78
Table 20	Resident Population Projections, St. Croix: 1991-2000	87
Table 21	Current Acreage/Population Relations by Land Use Type	88
Table 22	Projected Peak Daily Seasonal Population, St. Croix: 1991 - 2000	88
Table 23	Hotel/Seasonal Unit Projects Approved or Application Pending, St. Croix	89
Table 24	Commercial Projects Approved or Application Pending	90
Table 25	Estimated Dwelling Units by Density Type, St. Croix: 1990	93
Table 26	Estimated Dwelling Units Demand by Density	

	Type, St. Croix: 2000	93
Table 27	Estimated Residential Needs by Density Type, St. Croix: 1991-2000	94
Table 28	Planning District Population Growth, St. Croix: 1980-1990 and Projected Population for 2000	94
Table 29	Relative Impact of Planning Process	97
Table 30	Major Project Determination Thresholds.	157

FOREWORD

The V.I. Comprehensive Land and Water Use Plan (CLWUP) is the primary growth management mechanism for the Territory. Governor Alexander A. Farrelly indicated at the outset of the Plan's development: "The Plan will be our guide as to how, when and where we grow and develop..." from now to the year 2005. To better plan for the future of the Territory, however, it is important to understand the implications and effects of past planning efforts.

Planning History in the Virgin Islands

Significant plans have been prepared for various agencies and departments of the territorial Government since 1917. One of the first plans that was prepared in the post-military occupation era was completed in 1954. Called the Baranano Plan, it predated the Territory's first development surge of the 1960s. The Baranano Plan recommended a number of actions to promote greater environmental protection and create an infrastructure essential to support the Territory's economic development. It proposed the first comprehensive zoning plan. Although approved by the Legislature, very few of the Plan's recommendations were implemented.

In 1964, the Virgin Islands Planning Board (which had been created in 1950) developed a general physical plan. Making population assumptions and examining land use characteristics, it made detailed land use recommendations as well as long-term policy guidelines. The Plan's far-reaching recommendations provided the basis for the 1972 Zoning Law. Although never submitted for legislative approval, it is considered by many as having the most far-reaching effect on the Territory's physical development as any planning effort that has been conducted.

The rapid pace of development in the 1960s provided the stimulus for the Halprin Plan of 1968. With the first wave of development moving from the traditional towns to the countryside, this plan explored a wide range of conservation and preservation issues as well as the negative side-effects of growth: loss of open space, traffic congestion, population and ecological damage. It called for growth limits and efforts to restrict the development of the rural countryside from its suburbanizing trend. Embroiled in controversy, the plan was never completed, nor did it receive legislative approval. However, it played an important role in the establishment of the local historic preservation program. Additionally, many of the Plan's environmental concerns were later explored in the Coastal Zone Management Program.

Finally, in 1972, after the establishment of the Virgin Islands Planning Office, a revised Zoning Law was prepared to update the initial zoning plans prepared in 1964 by the former Planning Board. The update reflected traditional U.S. mainland suburban

type ordinances that, at the time, were aimed at accommodating low-density development outside of traditional towns. Cistern requirements precluded the need to extend potable water lines to the many areas that were just beginning to develop. Other public services, such as wastewater treatment and recreational facilities, lagged behind development of new housing and commercial areas. The low density pattern of scattered development simply made it too expensive to develop these facilities concurrently.

In 1978, the Virgin Islands Coastal Zone Management (CZM) Act was enacted. This plan defined and delineated the Territory's coastal zone, and established permissible land and water uses, a land and water use plan, and a set of policies to administer the program. It employed a two-tiered concept which applied major project review only to narrowly defined coastal areas. Upland development operated under a different set of policies, often without adequate consideration of environmental impact.

The intent of the CZM Program is to treat coastlines as unique places where conservation and special types of development should have priority. It seeks to achieve balance where there is competition among goals, such as where increasing coastal access competes with resource protection, where economic development conflicts with conservation, where urban expansion competes with the retention of natural areas, or where short-run economic gains result in the loss of long-run economic benefits. The program was the first in the Virgin Islands to introduce environmental protection standards into the land use regulatory system.

CZM introduced an additional layer of authority over certain land as a means to incorporate important issues which were not otherwise addressed in the land development regulatory process. However, this additional review of development only applied to a thin strip of coastal land; the majority of the Territory's land area remained without an up-to-date land use map to guide rezoning and development decisions. Obviously, development that occurs immediately along an island's perimeter is bound to have an effect on coastal resources. However, inland areas beyond the present CZM boundaries have just as profound an effect. This is especially true in the Territory, where the physical dimensions of the islands are relatively small, and there are considerable amounts of mountainous terrain. For example, a new condominium development on one of the mountainsides of an inland parcel on St. Thomas could create significant sedimentation problems to the harbors and bays. This, in turn, could have disastrous consequences for reefs, seagrass beds, and water quality. The site, however, is outside the domain of CZM, and at the present time there are limits as to the stormwater controls that can be imposed.

Realizing the political limitations in developing primarily physical development plans, the government embarked on a decision-

making oriented plan in the 1980s. The Virgin Islands comprehensive policy plan, developed between 1983-1991, provided goals, objectives, and strategies for government action on a wide range of issues, such as land use, housing, economic development, and cultural resources. The Guidelines for the Development of a Long-Range Comprehensive Plan for the United States Virgin Islands provide the foundation upon which the present comprehensive land and water use plan is built.

Despite an abundance of planning efforts over the last 40 years, very little implementation of these plans has occurred. The reasons for this are varied, ranging from the highly dependent nature of the economy to the high level of political intervention in Territorial affairs (Gilliard-Payne, 1988). These conditions have limited the systematic and orderly development of the Territory.

In 1970, the Legislature understood the need for a comprehensive plan to guide the U.S Virgin Islands growth when it passed Act 2774, which states: "The Government of the Virgin Islands has a positive interest in the establishment of a planning process and in the preparation and the maintenance of a long-term comprehensive plan for the physical, social, and economic development of the Virgin Islands which can serve for all departments and agencies." Governor Farrelly, in releasing the Policy Guidelines in April 1989, stated that it is the intent of those guidelines to serve as a policy framework within which "we shall move forward, with the approval of the Legislature, to develop the Comprehensive Plan for physical, social and economic development of the Virgin Islands." Furthermore, the Governor's Reorganization and Consolidation Act of 1987 mandates that the Department of Planning and Natural Resources prepare, and upon legislative approval, issue and have in continuous process of revision, a long-range comprehensive plan for the physical, social, and economic development of the Virgin Island as stated in Act 2774.

The U.S Virgin Islands has experienced significant population increase since the enactment of Act 2774 in 1970. The last 30 years have seen a gradual degradation of the quality of life of the citizens of the Territory. The complex interrelationships of increased traffic congestion; the rising cost of housing, food and other living expenses; rapid development of land, associated with a significant loss of environmentally sensitive areas and open space; degradation of water quality; and the rapid development of coastal areas and beaches, have created problems with complex solutions.

As the Virgin Islands has undergone change over the past three decades, so has the planning profession. An advantage that the Territory has today, compared with 30 years ago, is that tools have now been developed that can truly assist in guiding government and, ultimately, its citizens, in balancing development

pressures with the host of social, economic, and environmental impacts that usually result from rapid growth. For the first time, it is now possible that development and conservation of natural resources can go hand in hand.

INTRODUCTION

Planning is a process. The development of this Comprehensive Land and Water Use Plan has been a cooperative effort by the Department of Planning and Natural Resources (DPNR), its consultants, numerous government agencies, and the many individuals who comprise the Community and Technical Advisory Committees. A Land and Water Use Plan is a comprehensive, coordinated, and continuing program, the purpose of which is to help public and private decision makers arrive at decisions that promote the common good.

The Plan includes: (1) identification of problems; (2) research and analysis to provide definitive understanding of these problems; (3) formulation of goals and objectives to be attained in alleviating these problems; (4) development and evaluation of alternative plans to attain the agreed upon goals and objectives; (5) recommendation of appropriate courses of action from the alternatives; and (6) implementation of the approved plan program. Land use planning entails addressing what is needed to support development, whether it be adequate roads, public water and sewer systems, or other public services such as recreational facilities, public transit, or health care facilities.

WHAT DO WE HAVE?

The first phase of the planning process involved the collection and analysis of data in the areas of environmental affairs, land use, transportation, public facilities (schools, health care, public safety, etc.), public services (potable water, sanitary sewer, solid waste disposal), historical and archaeological sites, physical considerations (steep slopes, flood plains), and historical growth patterns. These efforts culminated in Technical Report I. Technical Report I represents an inventory of existing conditions affecting the natural and social environment in the Virgin Islands.

WHAT DO WE WANT?

The second major phase of the planning process involved the creation of alternative concept plans, each providing a different perspective of what the Virgin Islands might look like in the 2005.

At key points in this process, the Department held meetings with the public (e.g. community advisory committee, technical advisory committees, and the general public) to solicit input into the preparation of a preferred alternative concept plan. Upon the completion of the data collection and analysis phase of the project, several town meetings were held to report the findings to the residents of St. Croix, St. John, and St. Thomas. Hundreds of

people attended these meetings and provided additional information, as well as their thoughts and concerns for the future of the Territory. Following these town meetings, a series of alternative development concepts were prepared for each island and, again, were presented to the public a second set of town meetings. At those meetings, residents selected a preferred alternative. It is from these meetings that the development of the final plan evolved and is presented in this document. In addition, DPNR staff conducted several meetings with Citizens Advisory Committees on each island throughout the process. These meetings enabled the staff to refine the concept plans with specific knowledge of local conditions to develop a realistic Land and Water Use Plan for each island.

HOW DO WE GET WHAT WE WANT?

The third phase of the planning process will result in the formulation of the final Plan, and the preparation of the development regulations necessary to implement the plan. The V.I. Development Law is the regulatory mechanism which establishes standards, procedures, and requirements for all development within the Territory.

With a Comprehensive Land and Water Use Plan in place the timely provision of adequate community services, protection of the delicate ecological balance of the environment and promotion of the health, safety, prosperity and general welfare of Virgin Islands Citizens and visitors is now possible.

The starting point for the Comprehensive Land and Water Use Plan has been the Guidelines for the Development of a Long-Range Comprehensive Plan for the United States Virgin Islands presented to the public in 1989 and adopted in May 1991. The Land and Water Use Element within the Guidelines is the foundation upon which this plan is built. The goals, objectives, and strategies of the Land and Water Use Element are contained in Appendix A. The reader is urged to review them as they provide a solid basis for fuller conceptual understanding of the CLWUP.

PART I: PLAN RATIONALE

WHAT DO WE HAVE?

The absence of strong planning controls in the Territory has led to a number of specific issues and problems. These issues are summarized below.

Infrastructure Deficiencies

Due to a decrease in federal subsidies for the construction of capital improvements programs, the local Government has been unable to sufficiently provide the basic services required in the Territory. Two of these basic services are, (1) the adequate and safe treatment of wastewater, and (2) the provision of a public potable water supply. At the present time, both of these public services are of insufficient quantity and inadequate quality, particularly on St. Thomas (Caribbean Research Institute, 1979; U.S. Environmental Protection Agency, 1984; deJongh & Little Associates, 1987).

Rapid development and population growth, and continuing difficulties with the effective operation and maintenance of separate and geographically dispersed wastewater treatment plants have resulted in severe water pollution and degradation of the surrounding natural environment. Inadequate treatment facilities, particularly on the East End of St. Thomas and the largest plant in Charlotte Amalie, at the Cyril E. King Airport, have discharged poorly or untreated effluent into coastal waters for years, causing severe harm to the marine ecosystem, lowering water quality, and endangering the public health (Island Resources Foundation, 1976; U.S. Environmental Protection Agency, 1984; Oostdam and Gjessing, 1987).

In 1985, the territorial Government agreed to a consent order with the U.S. Environmental Protection Agency to construct a new wastewater treatment facility by 1988 at the Mangrove Lagoon to serve the East End of St. Thomas, and to provide additional treatment to effluent discharged at the Charlotte Amalie plant (deJongh & Little Associates, 1987). By 1991, the Mangrove Lagoon plant had not even begun construction and no additional water quality treatment was being provided at the airport plant (Francis, 1991).

Insufficient data exist at the present time to determine actual flows in many of the treatment plants on St. Thomas (Cornwall, 1991). In other cases, such as the Enighed Pond wastewater treatment plant on St. John, the current flow of effluent is twice that of the plant capacity and improvements are needed immediately (Francis, 1991). The St. Croix treatment plant located at the Southshore handles all effluent from the island and is currently operating at approximately 50 percent capacity on dry days. However, during rainy days, stormwater entering the system through

cracked lines often doubles the normal flow. (Cornwall, 1991).

What the Government lacks in ability to manage the wastewater treatment system has been offset by the use of individual septic systems by homeowners. However, poorly regulated placement and construction, in the use of individual septic systems have, in some areas, caused surface and groundwater contamination due to poor soil conditions. Either the soil is too clayey to absorb water adequately or too thin to allow proper treatment of septic effluent prior to contact with groundwater. Excessive density of development has been permitted without proper wastewater treatment facilities. In these cases, development is allowed to proceed on septic systems while the Government plays "catch-up" in providing regional facilities to the development at a later date. As development in a particular area increases over time, the ability of individual septic systems to treat additional water fails as the soil absorption capacity is reached or exceeded. The government is then forced to extend sewer lines to the particular area at a much greater cost than if lines were required at the time of development.

The public water system in the Territory is heavily burdened (CH2M Hill, 1983). As demand increases, the production of desalinated water increases, as well as the cost (V.I Water and Power Authority, 1989). Rationing, periodic breakdowns, and resulting water quality alerts are commonplace. Primary demand is met by desalination, which requires large amounts of imported petroleum to fuel the system. Rainfall catchment continues to be the most reliable method of collection and storage for individuals homes (Ruskin and Callender, 1988). However, during periods of drought, trucked water supplies are usually purchased to augment cistern supplies of those housing units and businesses not connected to the public distribution system.

Several constraining factors contribute to the poor delivery of these public services, such as the aging nature of the necessary infrastructure, including leaking transmission and distribution lines. Studies have estimated that as much as 50 percent of the water pumped through WAPA's transmission lines is lost through leakage or illegal (unmetered) connections (CH2M Hill, 1983; Mathes, 1991). At the same time, infiltration of storm water into sanitary sewer collection lines during periods of heavy rainfall can more than double the normal flow of effluent, causing the treatment plants to exceed capacity and discharge effluent before it can be properly treated (Cornwall and Francis, 1991).

Other constraining factors include: (1) difficult hilly terrain which increases the cost, duration of construction, and adequate maintenance of force mains, pumps, and lifts stations; (2) lack of adequate trained staff to operate and maintain these facilities; (3) the lack of local funds to help defray these costs; and (4) poor planning and coordination between the approval

of development which may require these services and the actual ability of the Government to deliver those services (CH2M Hill, 1983).

While federal funds are forthcoming to construct the Mangrove Lagoon wastewater treatment plant, little linkage exists between the demand for these services and the proportional costs to extend them. The Public Works Department recently instituted a **user fee** for new connections to the sanitary sewer system. In its initial year, the fee garnered \$600,000 to help operate and improve the system (Francis, 1991).

Traffic circulation is a mounting problem in the Territory. Traffic congestion continues to increase during peak periods (i.e., 7-9 a.m. and 3-6 p.m.) as more and more automobiles are brought into the Islands (Gannet-Fleming, Inc., 1982). Vehicular back-ups of more than a mile are not uncommon in downtown Charlotte Amalie, Raphune Hill and Long Bay on St. Thomas, and in the Christiansted area and Sunny Isles region on St. Croix. The situation is more acute on St. Thomas, where expansion of the roadway network is more difficult and costly due to the level of existing development and the mountainous physical terrain.

As of September, 1991, there were 26,648 registered vehicles on St. Thomas; 21,852 on St. Croix; and 1,500 on St. John; rendering a total of more than 50,000 registered vehicles in the Territory. The 1990 Census revealed that there were 44,372 residents on St. Thomas; 49,725 on St. Croix; and 2,472 on St. John (U.S. Census, 1990). The relationship between motor vehicles and permanent population for the islands is as follows: St. Thomas, 1 car for every 1.7 resident; St. Croix, 1 car for every 2.3 persons; and St. John, 1 car for every 1.6 residents. This amounts to more than one car for every two people. Of the total number of vehicles, St. Thomas accommodates slightly more than half, or more than 960 vehicles per square mile. When measured by any insular standard, this is a serious problem in terms of traffic congestion, inconvenience, health, and personal discomfort.

Automobile parking space is also in great demand (Gannet-Fleming, Inc, 1982). The lack of available spaces to accommodate the overall need forces vehicles to park in unsafe areas, thereby causing dangerous traffic conditions and interference with normal pedestrian traffic. The lack of safety designed on-site parking for residential and commercial uses is prevalent in many growing areas.

Lack of Affordable Housing

Housing and land value costs in the territory have skyrocketed during the past two decades. According to data from the V.I.

Bureau of Economic Research, the average sales price of a home in the Territory increased 60 percent since 1980. The average sales price of a condominium increased almost 50 percent (V.I. Bureau of Economic Research, 1991). In 1990 the average sales price of a home in St. Thomas/St. John was over \$225,000. The comparable figure for St. Croix was more than \$160,000 (Ibid). These high housing costs have priced many Virgin Islanders out of the homeownership market and into the rental units or multiple family-type housing. While some of this increase has been attributed to speculation, there are other contributing factors which include the high cost of construction materials, and the mandate to construct cisterns. As much as 25 to 30 percent of the total construction cost of a single family home can be attributed to the construction of foundation, cistern, and floor slab. This cost could be reduced in the future if more dwelling units are constructed with connection to the WAPA potable water supply system or utilize regional cistern storage and distribution systems.

Environmental Degradation

Perhaps the most significant impact of growth and development in the Territory has been the environmental damage to the land and marine ecosystems.

- **Water Quality** - The quality of most coastal waters is still relatively high, and some areas have improved in recent years. Others are still polluted and showing signs of deterioration (Ootsdam and Gjessing, 1987; DPNR Division of Environmental Protection, 1988). The quality of surrounding waters is affected mainly by sediment runoff, dredging and filling activities, discharge of sewage effluents, and intensive boating activity (Island Resources Foundation, 1976 and 1988).

The degradation of water quality can have severe adverse impacts upon certain fragile near-shore ecosystems, including beaches, coral reefs, mangrove lagoons and seagrass beds. These marine resources constitute significant foundations to not only the visual quality of life, but to the economic prosperity of the Territory as well.

- **Sediment Runoff**- The problem of excessive sediment runoff is caused primarily by increased urbanization of previously undeveloped lands (Ibid). Construction activities disturb the soil by stripping vegetation and altering natural landforms. Alterations to the existing land cover, such as housing developments and paving, increase runoff and the flow of sediments, thereby contributing to turbidity in coastal waters. The effects of sediment runoff are particularly acute and noticeable in the bays and harbors adjacent to developed watersheds immediately following a heavy rainfall. Large plumes of silt extend from the mouths of drainage guts into the adjacent waters. The sedimentation effects are harmful to the marine

environment, aesthetically objectionable, and increase the necessity for maintenance dredging.

Attempts to manage stormwater are relatively new. Stormwater regulations in the United States have only been created in the past ten years. However, most researchers agree that stormwater runoff is responsible for the following problems:

Stormwater flushes nutrients and carries disease organisms into coastal waters at a rate comparable to effluent discharges from wastewater treatment facilities.

Stormwater deposits 80 to 95 percent of the heavy metals that reach the coastal waters. Lead, zinc, copper cadmium and chromium, along with oils and greases, are flushed from highways and parking areas into the coastal waters. Heavy metals are toxic to plankton, fish, and other aquatic organisms, reducing their ability to reproduce (Florida Department of Environmental Regulations, 1988; Marine Environments of the Virgin Islands: Technical Supplement Number 1, 1977; Coastal Zone Management Marine Environment of the Virgin Islands, 1976).

- Dredging and Filling Activities - Dredging of sand and other materials to create landfills and marina sites, improve navigation, and provide construction aggregate has occurred in near-shore areas on a large scale and altered and destroyed natural cycles and ecosystems, such as mangrove areas, salt pond, and beaches (U.S. Commerce Department, OCZM, 1979).

Near-shore dredging activities increase turbidity which disrupt natural marine ecological systems and create potential beach erosion problems. The alteration and destruction of wetlands and ponds affect fish and wildlife productivity and the drainage and flushing of storm and flood waters on adjacent beaches.

The most notable activities of this type are the filling and dredging of Krause Lagoon, St. Croix; and Mosquito (Lindbergh) Bay, Charlotte Amalie Harbor, Vessup Bay, Bolongo Bay and Sapphire, St. Thomas; the piecemeal construction activities at the Mangrove Lagoon, St. Thomas; the stripping of sand on the East End of St. Croix; dredging in Christiansted Harbor; and the alteration of the Mandahl Salt Pond, St. Thomas (Ibid).

Both sediment runoff and the dredge and fill activities have resulted in increased water turbidity. Heavy sedimentation has damaged both reef and fish-life, and is also unappealing for swimming and snorkeling (Boulon and Beets, 1987, 1990). Turbid or

cloudy waters limit light needed for food production by marine plants. These latter conditions, if allowed to continue, will have a detrimental effect on the tourism industry in the Territory (Ibid).

- Discharge of Sewage Effluents - The discharge of raw sewage and toxic substances from boats and marine operations, as well as from malfunctioning sewage treatment plants and inadequate septic tanks, contributes significantly to changes in water quality. In many instances, liquid waste is disposed of in those waters with the least capacity to tolerate further stresses. Even minimal degradation of water quality can have severe adverse impacts upon certain fragile near-shore eco-systems (DPNR, Division of Environmental Protection, 1988).

- Use Conflicts - Increased economic activities and accompanying large scale urban growth have created unprecedented pressure on the resources of the islands' coastlines. Shoreline areas are highly desirable for development and as a result, residential, commercial, industrial, recreational, public, and institutional uses compete for severely limited space. The most significant problems include the loss of important natural areas, visual conflict, and development in hazard prone areas.

- Loss of Natural Areas - Unfortunately, areas that are frequently attractive for the location of economic activities are ecologically fragile and extremely vulnerable to development of any kind. The loss of natural areas is frequently the result of dredge and fill operations. Ecologically valuable reefs have been blasted and mangroves, salt ponds, and beaches have been filled or dredged to accommodate industrial, resort, or marina development (U.S. Department of Commerce, OCZM, 1979). In other instances, the functioning of these vital areas has been impaired by encroaching development. These losses are irrevocable and have contributed to declining marine productivity, as well as other coastal resource related problems (DPNR, Fish and Wildlife Division, 1989).

- Visual Conflict - One of the most important resources in the Virgin Islands is its high degree of visual quality (Zube, et al., 1968). The islands are beautiful, and their beauty satisfies residents and tourists alike. Visual access to the shoreline is impeded by haphazard development. Piecemeal destruction of coastal resources, the type of construction, and location of facilities along the shoreline is a major aesthetic concern. Frequently, adjacent uses conflict drastically in character, as well as the quality of design and construction. Even small projects can deface the landscape.

- Development in Hazard Prone Areas - The devastating effects of Hurricane Hugo in September, 1989 will be long remembered in the Virgin Islands. Property losses totalled in the hundreds of

millions of dollars due to brutally high winds and flooding. The damage to homes, businesses and property was exacerbated, in many cases, where development was allowed in areas particularly sensitive to flooding from runoff. These areas include the mouths of guts, floodplains, shorelines, and filled land that are subject to inundation from tidal storm surges.

Earthquakes have been recorded in the Territory since the mid-1800s. In recent years, seismic activities have been observed with an intensity of 4.0 to 5.0 on the Richter scale, with related property damage (McCann, 1984).

As to be expected in an island setting, substantial earthquake risks include inundation of low-lying coastal area by tsunamis and liquefaction of sandy materials in areas of high water table, in addition to ground shaking.

Of particular concern are steeply sloped hillsides, which are susceptible to earthquake induced landsliding. The rock is often fractured and weathered, which leads to increased hazard with time and rainfall. Slumping has occurred in some areas (Aley, et.al., 1989). Many slopes that have failed during previous heavy rains are also likely to fail in the event of a major earthquake (Fischer, 1984).

The other critical areas are waterfront locations situated on loose alluvial soils or man-made fills. The performance of such materials in an earthquake is notoriously poor. The water-soaked soils tend to amplify even weak ground motions, as well as liquefy easily. The result is an increased susceptibility to damage in these areas.

These conditions are of particular concern for structures and development in susceptible areas. Many hillside structures supported on stilts are considered likely to sustain earthquake induced damage. Such structures abound in the islands.

Other structural concerns include historic buildings, and those with heavy roofs and elevated water tanks.

Of significant concern is the low-lying and populated waterfront areas of Charlotte Amalie, Frederiksted, Christiansted, Coral Bay and Cruz Bay. These areas are also endangered by tsunamis generated by seismic activity elsewhere in the Lesser Antilles. Many of these same areas are located on liquefaction-prone alluvial soils. Thus, flooding, wave forces, settlement, and liquefaction are dangers in these areas, in addition to the effects of ground shaking vibration.

Roadways on all three island are subject to rock slope failures, or loss of strength of the subgrade in low-lying alluvial areas.

Buildings in both historic areas and on hillside sites constructed of unreinforced masonry could suffer extensive damage as well.

WHAT DO WE WANT?

The rationale for this Comprehensive Land and Water Use Plan for the Virgin Islands provides the basis for land and water use decisions for the next ten years.

Land available for the future development in the Territory is encompassed on three relatively small islands. These islands have a finite amount of area where new growth can occur. If growth were to continue in the Territory for the next 10 years in the same manner that it has for the past 25 years, a considerable amount of land would be consumed and the various infrastructure deficiencies that currently exist would be even greater. Additionally, greater pressures would be brought to bear on environmentally sensitive lands and precious natural resources. These factors are dealt with in the following discussion.

Availability of Public Facilities and Services

One of the principal functions of local Government is to provide public facilities and services in the quantity and quality desired by the population served. The Virgin Islands Government has not always been able to assess the levels of service it provides. This is due partly to the fact that the development of infrastructure has not always been tied to a projected level of growth and related standard(s).

In order for the territorial Government to begin providing public services and facilities concurrent with the demand, the Land and Water Use Plan proposes a systematic program to link the direction of future population growth (i.e., demand) with the availability of adequate public services. The system, which is proposed to be incorporated into an overall capital improvements program, is based on establishing, implementing, and monitoring appropriate levels of service for public facilities and services.

Services and facilities that have a direct effect on land use and are publicly managed are discussed in the document, Levels of Services. Discussion includes park and recreation areas, public schools, police protection, fire/rescue services, transportation, sanitary sewers, potable water, solid waste, and energy.

The purpose of incorporating public service coordination and standards into the Comprehensive Land and Water Use Plan is three-fold: first, to insure that the provision of public services occurs at the proper level and at the proper time during the course of growth and development; second, to further the use of the delivery of public services as a positive planning tool; and

third, to insure that a tangible standard is set to measure the quality of life of the residents of the Territory. By the use of these guidelines the future growth (land use decisions) of the islands can be guided through the provision of public facilities.

The land allocation intensity system devised is based, to a greater extent, on the projects planned by the Public Works Department and the Water and Power Authority (WAPA), to the extent that those projects conform to the overall criteria of the CLWUP.

The expansion of existing potable water and sanitary sewer systems and the improving and widening of roadways must be determined within the context of a rational land development policy for each island. It makes little sense to propose an extension of sewer lines into an area where there is limited growth potential. These issues are discussed further in the following sections.

Potable Water and Sanitary Sewer Service Areas

Water quality remains a major concern in the Virgin Islands. The provision of potable water, and wastewater collection and disposal service pose complex problems. Quick, easy, and inexpensive solutions are not readily available. Moreover, the maintenance of potable water supply goes beyond cisterns and pipelines and includes the protection of groundwater resources.

Areas currently served by both potable water and sanitary sewer facilities, or planned to be serviced within the ten-year time frame of the Plan are recognized as emerging growth areas where higher intensity land uses are encouraged. These service areas are shown on the Public Services Maps contained in Technical Document I.

Major expansion of wastewater treatment facilities are planned for St. Thomas and St. John. The Mangrove Lagoon Wastewater Facilities Plan indicates that the existing five package plants on the East End of St. Thomas will be ultimately tied together into one system. A new treatment plant with a 1.2 million gallons per day (MGD) capacity will be constructed on Long Point with collection lines transversing Turpentine Run. This facility will not only be able to serve the existing development in Anna's Retreat, but also new developments in Nadir, Bovoni, Mariendahl, and points in Nazareth. The Comprehensive Land and Water Use Plan proposes moderate- to high-intensity development on St. Thomas' East End. This new treatment plant should be able to accommodate the sewage effluents expected to be generated by new development.

Similar provisions are being made in St. John. The Cruz Bay Wastewater Facilities Plan calls for construction of a new wastewater treatment plant in the Enighed Pond area. The new facility with a 200,000 gallons per day capacity will ultimately

be able to serve all of Cruz Bay, as well as portions of the surrounding area.

On St. Croix, expansion of the existing treatment system is planned to accommodate Williams Delight and Tide Village, with eventual connection to Grove Place, Catherine's Rest and Clifton Hill Estates (Hansen, 1990). The South Shore treatment plant on St. Croix has a 4.0 MGD capacity and is handling, on average, 2.2 MGD of effluent.

The provision of potable water supplies to meet the demand of future growth will be one of most important challenges the government faces in the next decade. Reliance on cisterns for rainfall catchment will continue as the primary source of potable water for residents living in the low density areas outside the public water service area. WAPA's plants, however, will continue to be the primary source Territory-wide, especially during extended periods of drought.

Public water service areas are established on all three major islands. On St. Thomas, the desalination plant at Krum Bay is the main production facility. WAPA operates a distribution system, including pumping and storage facilities, which supplies potable water to the residents of the Charlotte Amalie urbanized area and the immediate environs, including the growing mid-island area of Donoe and Anna's Retreat. A line also extends from Fort Mylner, running down Turpentine Run to the intersection of the East End Road, and westward to serve a portion of Bovoni. The main area targeted for future public water service is the eastern quadrant of the island. WAPA is in the preliminary planning stages of developing a new desalination unit for the East End, tentatively planned for the Long Point area. This facility along with a new transmission and distribution system, could produce enough freshwater to service existing and future development from Bovoni to Red Hook and Smith Bay.

The public potable water supply system on St. John is centered around the new Turner Bay desalination plant. This is a 155,000 gallons per day facility, which is experiencing actual demand of approximately 100,000 gallons per day as of October 1993. The service area of the plant is the immediate Cruz Bay area. This facility will also provide water for standpipes used for trucked water deliveries to the outlying parts of the island not included in the WAPA service area. No major expansions of service beyond the Cruz Bay area are planned by WAPA at the present time.

The public system on St. Croix presently serves both Christiansted and Frederiksted, as well as most of the interior portion of the island from Concordia to Sunny Isles. A number of areas are slated to be incorporated into the public water system within the next three to five years (Cipriani, 1990). These include:

- **Welcome**
- **Williams Delight**
- **Work and Rest**
- **Carlton**
- **Sion Farm**
- **Mon Bijou** (The area currently not on the public system)

Also several areas east of Christiansted, including Boetzburg and Mt. Washington are being considered for connection to the system (Ibid).

Adequate Roadways and Mass Transit Service Areas

Adequate transportation facilities are an important consideration in future land use decisions, because the existing highway capacity is increasingly likely to be a limiting factor on development in many areas of the Territory.

Traffic congestion is typically attributed to many factors that are physical as well as behavioral in nature. The physical constraints of roadways in the Territory include: steep grades with curved alignments which slow traffic; narrow rights-of-way and no shoulders which inhibit roadway expansion; inadequate signage which contributes to motorist confusion and threaten traffic safety; and the growing demand for parking spaces that exceeds the supply. This situation is exacerbated by the lack of off-street parking, which frequently results in double parking and illegal on-street parking. This adds unnecessary delays to the traffic flow, reduces available lane capacities, and contributes to increased congestion.

Perhaps equally difficult to overcome are behavioral traits that characterize the traffic congestion picture in the Territory. The demand for automobile ownership is very high in the Territory. This is due to a number of contributing factors, including: the rising level of expectation experienced by many Virgin Islanders as wages and job opportunities increased between 1960 and 1990; the need for private automobiles as the accommodative zoning controls of the same period dispersed the population into areas further away from the towns and major employment centers; and the level of provision of mass transit service which has not kept pace with population growth and its geographical distribution throughout the islands.

Today, there is approximately one automobile in the Territory for every two residents. And in some areas, such as St. Thomas, there is simply more traffic demand than the existing facilities can serve (Gannet-Fleming, Inc., 1982).

The large numbers of automobiles in the Territory, combined with the lack of adequately maintained roads, further reduces satisfactory driving conditions. Due to inadequate subdivision

and other land development enforcement regulations, some areas have been privately developed with substandard roads that are often unpaved, designed with inadequate drainage control features and are often abandoned by the developer and become the responsibility of the government. Operation and maintenance of these roads are very costly and often exceed the government's ability to fund the improvements to bring these roads up to safe operating standards. For residents of these subdivisions, this adds to the driving time, property damage, and inconvenience they must endure (Gannet -Fleming, Inc., 1982).

Encouraging development to locate only into areas already served or projected to be served by adequate roads and/or mass transit services reduce the need to construct new facilities and increases the efficiency of mass transit service delivery. Such a rationale also reduces the reliance on some island resources, including the large amounts of land required for construction of new roadways, additional land for new parking lots, and the need for imported petroleum to fuel automobiles.

According to the Transit Development Plan Update, prepared for the Public Works Department in 1982, there are only two alternatives to the growing traffic congestion problem in the Territory: (1) provide greater capacity, or (2) reduce the demand for additional roadways. The Territory's Transportational Improvement Plan lays out the planned improvements in the Territory's highway network for the next several years.

However, the high cost of making significant transportation improvements is one of the factors limiting the government's ability to expand roadway capacity. A more economical approach is to expand the Territory's mass transit system to serve existing and planned future areas of development. This will reduce the number of vehicle trips on the Territory's roadways, and thereby lessen congestion levels.

In 1990, the Government embarked on a mass transit expansion program. As a result, the mass transit service on St. Thomas was extended to areas of major development, however, service on St. Croix and St. John is still limited or non-existent. The Virgin Islands Transportation Authority (VITRAN) is the main provider of bus service on St. Thomas. It provides service linking most major residential areas, shopping centers, major employment centers and schools on St. Thomas. On St. Croix, a private taxi-bus system is the main provider of service. It provides service between Christiansted and Frederiksted, and a limited portion of the northern section of the island. VITRAN plans to establish public service on St. Croix within the next few years (Neilson, 1991). At the present time, St. John has no fixed route system. The

service areas on each island, along with the major roads are shown on the Major Roadways and Mass Transit Service Areas map in the Technical Document I.

Although the history of Euclidean zoning spans approximately 67 years, it has failed to promote the efficient use of land resources. In an attempt to provide developers with inexpensive land, zoning permitted scattered development. This created the development of a pattern called urban sprawl (Callies & Freilich, 1986, pg.796). As a result of the sprawl, forests have been felled, floodplains and coastal areas have been filled, and agricultural lands have been destroyed. In addition, it has substantially increased the cost of providing public facilities and services to residents.

Environmentally Sensitive Lands

The attitude toward land in the Virgin Islands has changed over the years (Blake, 1977). During the economic boom of the 1960s and 1970s, land was viewed as a commodity to be bought, sold or in the case of filled lands, created. As in any insular environment, the land supply is finite. Where land was inexpensive, environmentally sensitive areas were usually bypassed (such as steep slopes). This was generally the development process, except in areas where the short-term economic return outweighed the environmental consequences. This has been true, for example, of floodplains and areas of good agricultural soils. They are relatively flat and dry land areas that are easily developable. As the demand for land increased with population growth so did land values. Now, because land is so expensive, it is more cost effective to build in areas by flattening, draining or filling them.

Most development proposals have been viewed with a strong belief in the market. If the economic benefit (in new jobs created and taxes generated) exceeded the cost, development generally proceeded.

Since that time, changing social values in the Virgin Islands have increased the level of government intervention in the marketplace.

The ecological consequences of development elevated the interest in environmental protection into the private and public decision-making process. Ecological value must now be considered alongside economic benefits, as well as social costs, in the future development of the Territory's finite land supply.

The necessity for government involvement in environmentally sensitive land comes from the essentially public character of these land resources. The destruction of environmentally sensitive areas does not mean just the possible loss of some intrinsic environmental values or benefits, but also loss to the social and economic welfare of the Territory. Environmentally

sensitive areas are those whose destruction or disturbance will immediately affect the life of a community by either, (1) creating hazards such as flooding and landslides, (2) destroying important public resources such as water supplies and the water quality of the coastal environment, or (3) wasting important productive lands renewable resources, such as good agricultural lands. Each of these threatens the general welfare of the Territory and results in economic loss (Thurow et. al., 1975).

Local regulation is needed, not only because of the public character of the resources, but also because the real estate market does not consider the benefits of protecting these resources. The functions of these environmentally sensitive areas are what economists call "public goods". If they benefit one person they benefit all. A mangrove stand, for example, filters sediment and traps nutrients from upland runoff, thus cleansing water before it enters the sea. This is an important function, but the landowner cannot sell the filtering capacity of his land.

But from the "public goods" perspective, if the land is providing a cleaner ocean for one man it is providing it for all people who use and enjoy the ocean. Thus, in terms of maximizing his own profits, he may be better off to develop the mangroves so he will have more land to sell, but the larger community will then have to absorb the cost of lowered water quality. This example is particularly relevant to the Virgin Islands.

Protecting sensitive land areas involves important public costs and benefits that are inadequately considered by the normal market mechanisms. Therefore, it is essential that communities utilize their police powers to ensure a balance between public interest -- the health and safety, and welfare of the community -- and the landowner's desire to his property.

The Virgin Islands is fortunate to be endowed with many natural resources which contribute significantly to the islands' ecology, economy, and natural beauty. These features are important contributions to the quality of life. Certainly these areas or resources deserve special attention, since they are irreplaceable and their loss would deny future generations the benefits of their existence. Loss of a rare or unique resource, such as the loss of a plant or animal specie, underscores man's disregard of the natural environment and its ecological processes. In the Virgin Islands, the retention of these ecologically sensitive areas, in addition to being environmentally proper, is also good business. If the environment is degraded, so is the economic base.

Rare and unique natural areas have more than merely economic value. These resources represent an intrinsic rather than a value-added economic base. As such, the economic return to the Territory is potentially greater and more stable, and, in some cases, economically indispensable. Fewer residents would stay and not as many tourists would visit the islands if many of the

beautiful beaches were lost to overdevelopment or, conversely, lacked easy public access. An estuary which had the mangroves removed from its fringes, would support fewer fish and fishermen.

Natural areas also have important ecological value and serve as natural scientific laboratories. The study of natural sciences and the general understanding of the natural environment depend on these unusually rich areas. The coral reefs lying off the coast are some of the most complex, productive, and diversified ecological systems on earth. Many undeveloped beaches are historic nesting grounds for the green turtle, an endangered species whose little understood life cycle is still being studied.

The salt ponds and mangrove lagoons are inhabited by fauna found nowhere else in the Territory (DPNR, Fish and Wildlife Division, 1989).

In addition to ecological value, many environmentally unique areas, such as the dry scrub vegetation on the eastern ends of the islands and the more lush and abundant wet tropical forest on the western ends, serve very important natural functions. The value of these areas for their drainage, soil retention, and natural habitat function is not replaceable. Salt ponds and mangrove lagoons serve to enhance water quality and reduce degradation of coastal marine resources, such as coral reefs and seagrass beds by acting to absorb the heavy impact of stormwater runoff, trapping sediments and filtering pollutants (Island Resources Foundation, 1976).

STEEP SLOPES

Topography is one of the most severe natural constraints to development in the Virgin Islands. Due to the scarcity of flat land, especially on St. Thomas and St. John, development has taken place far beyond the typical environmental constraint of 15 percent slopes. A more realistic cut-off point for development in the Territory are slopes in excess of 45 percent. This determination is based upon an analysis of existing development patterns and associated topographical data. Areas of steep slopes in excess of 35 percent are shown on the Slopes Maps for each island in Technical Document I.

Steeply sloped hill ridges are geological features whose slopes and soils are in equilibrium with the vegetation, underlying geology, and the amount of precipitation (Thurow et al., 1975). Intensive development of these areas can affect their natural function of absorbing rainwater, retaining soil and vegetation cover, and providing an aesthetic resource. Excessive disturbance of these areas have resulted in a number of negative side-effects for all Virgin Islanders:

- Development of steeply sloped hillsides

results in the loss of slope and soil stability (Teytaud, 1983; Aley et. al., 1989). The removal of vegetation from the hillsides deprives the soil of the stabilizing function of the roots and the effects of wind and water erosion control capabilities of leaves and bushes. This increases the probability of erosion and causes a greater amount of siltation of guts, road washouts, and degradation of downstream coastal marine water quality (Hubbard, 1987). This latter condition, in turn, contributes to the loss of critical marine habitats, such as mangroves and seagrass beds (Rogers, 1988; Boulon and Beets, 1990).

- Development of steeply sloped lands increases run-off. Construction alters the natural drainage pattern of a mountainside by increasing the amount of impervious surface through soil compaction and grading, road construction, and the construction of buildings. This reduces the amount of groundwater precipitation and absorption, thereby increasing runoff (Marsh, 1978). Removal of vegetation cover decreases percolation of precipitation into the soil, which reduces the amount of groundwater recharge, and increases the amount of stormwater runoff that would ordinarily be absorbed by trees and shrubs. Increased runoff also exacerbates downstream flooding problems for many residential and institutional developments in the Territory (Aley, et al., 1989).
- Development on steeply sloped lands increases the cost of housing for the Virgin Islanders. Mountainsides offer wonderful ocean views for potential home-buyers and can provide relative privacy away from the more densely populated towns. The desirability of these areas is often expressed by significantly increased property values upon subdivision of the property. However, the rugged terrain translates into higher site development cost, including grading, road construction, and maintenance. The potential yield of this increased value is recouped by the landowner through sales of more expensive lots. This usually precludes efficient delivery of

public sewer and water lines, and requires continued reliance on cistern construction for rainfall harvesting and the use of septic tanks for wastewater treatment. These requirements often account for as much as 30 percent of the total cost to construct a finished house. In an effort to maximize the return on investment, many private homeowners often add several stories to a house over a period of several years, as affordability allows. This is done to accommodate additional family members and to provide rental units to help with mortgage payments. However, the increased household demand on water and wastewater use usually exceeds the original capacity of the cistern and septic tank. Cisterns go dry more frequently and, in areas of poor soil absorption capacity, such as top soil layer found on mountainsides, septic tank leaching fields fail and can lead to increases runoff of polluted water on downstream development.

- Over-development of mountainsides has contributed to the loss of the Virgin Islands aesthetic resources and open space (Halprin, 1969). The mountain areas of the Territory serve as ecological, as well as community boundaries, with unique areas of native vegetation. Some areas can provide a safe and attractive setting for houses and buildings, but overdevelopment will deprive the Virgin Islands of its attractive distinctive settings.
- Poorly designed and constructed developments on steep slopes frequently result in substantial costs to Virgin Islands taxpayers, either in repairs or for protective measures to prevent further drainage. Increased runoff and sedimentation from development on steep slopes requires increased public expenditures for flood control and stormwater management (O'Neil, 1990). If these costs were absorbed in specialized on-site design regulation, the general public would not have to encumber the additional expense. However, once the basic development pattern for an area is established, the government must either provide the protection or live with the

threat of disasters. In either case, it is an expensive undertaking. The territorial Government is currently instituting a remedial flood protection and drainage improvement program costing millions of dollars in local and federal monies to address this problem (Ibid).

- Poorly regulated development on steep slopes not only results in increased public expenditures for remedial protection, but additional dollars must be spent for various public utilities and public services in such areas as well. Development is more expensive on steep slopes than flatter terrain. Sewer and water lines in these areas require expensive design considerations and construction costs. Road construction on excessive grades requires more expensive design and engineering considerations and creates road cuts, as well as the need for additional erosion and drainage control measures. Similar specialized attention must be given to public buildings such as schools, fire stations, and health clinics.

Development on hillsides has had far reaching impacts on the Virgin Islands' land, water, and economic resources, yet limited development, consistent with the ability of the land to accommodate the level of intensity generated by a proposed land use can occur. A performance-based regulatory approach serves to mitigate the impact to a development site and prevents destructive off-site impacts. At the same time, designating very low-intensity uses which do not require extensive construction, such as agriculture, recreation, and conservation uses, can serve to protect the natural resource function of mountainous areas.

FLOODPLAINS

Substantial amounts of the land in the Virgin Islands are subject to flooding. Areas within 100-year floodplains are designated on the floodplain maps for each island in Technical Document I. Floodplains appear to be prime land for development because they are generally flat. However, the leading cause of flooding problems in the Territory has been the improper use and development of floodplains. A major contributing factor to flood damage has been the alteration of guts and attendant removal of vegetation, filling-in of debris, the installation of adequate culverts, and other drainage facilities.

Flood damage occurs when structures and facilities are improperly

located in areas subject to flooding. For example, development of a section of the Mon Bijou subdivision on St. Croix in a gut without adequate alternative drainage provisions has resulted repeatedly in significant residential property damage, and the expenditure of millions of dollars in government funds to alleviate future flooding. Similar problems with development in St. Thomas has occurred in Estate Thomas/Sugar Estate, Bovoni, and Contant (Francis, 1991). In these instances, remedial flood protection measures must be employed at great public expense.

Buildings and earthfill can obstruct the flow of floodwater, causing backflooding and higher than normal peak flows. Development on the floodplain, as well as in the watersheds of guts above the floodplains, can also increase the magnitude and frequency of floods and the extent of the area inundated. Such effects stem from the rapid rate of runoff and reduced permeability of surfaces that occur when rural land is covered by streets, parking lots, and roofs.

Several guidelines for floodplain management are proposed in the Comprehensive Land and Water Use Plan:

- Conservation and Management - Floodplains require careful management to prevent damage that results from floods and to preserve their value as scenic and agricultural resources. Floodplains provide significant areas of open space, serve as scenic buffers between incompatible land uses, and provide for prime agricultural opportunity. To protect vegetation along natural guts and water resources, preserve aesthetic values, and to prevent erosion and siltation problems, performance standards should be put into effect for development in these areas.
- Development - Only low-intensity activities that do not obstruct the flood flow should be allowed in the floodplain. Replacement of undersized culverts should be undertaken to relieve backwater flooding. No public or private construction should be permitted in a manner that will materially increase the degree of flooding.
- Flood Protection Elevation - The 100-year flood elevation increased by one foot is used for planning purposes as the flood protection elevation. The 100-year flood boundary encompasses lands that have at least a one in one hundred chance of being inundated in any given year. Such boundaries are determined

by Flood Insurance Rate Maps (FIRM), issued by the Federal Emergency Management Agency (FEMA). These areas are, however, subject to change when development increases the magnitude and the frequency of floods. In addition, the compilation of existing floodplain regulatory policies into a single floodplain protection performance standard should serve to better focus and regulate development within floodplains.

SHORELINES

After decades of intensive use, the man-induced impacts on the near-shore marine environment have become visible. Rapid growth in the numbers of marinas and anchorages for boaters has dramatically increased the use of the shoreline. At the same time, dredging activities, the filling of submerged land, the release of untreated sewage, and the increased sedimentation from on-shore construction projects have contributed to the loss of critical marine habitat; such as coral reefs, seagrass beds, and mangroves (deGraff and Moore, eds., 1987; Island Resource Foundation, 1988; Aley et al., 1989; Beets, 1990; Reed, 1990; Taylor, 1990). The importance of these marine ecosystems extends beyond the natural environment itself. For example, thousands of visitors each year come to the Virgin Islands to sail, swim, snorkel, and scuba dive around the abundant coral reefs and beaches, and in so doing, contribute significantly to the economy of the Territory. Boating activity is increasing at a rapid rate. Many harbors and bays are experiencing a growing demand for mooring permits and are becoming popular as anchorage areas for boaters. Seagrass beds and mangroves provide excellent foraging and breeding grounds for saltwater fish and crustaceans, which are the backbone of the Territory's fishing industry. Some areas are, in fact, experiencing pressure from over-fishing of this resource (deGraff and Moore, ed., 1987; Boulon, 1990).

The rapid growth experienced in the Territory over the past 30 years and the potential for further encroachment of development onto significant natural areas have forced the issue of environmental preservation to the forefront of land-use planning. The government and citizens of the island face a turning point in deciding the importance of these areas relative to continued development. Whether these areas should be entirely preserved by inclusion in a Territorial Park System, protected to a limited degree from degradation by legal regulatory mechanisms, or allowed to incur development encroachment and the resulting impacts, must be resolved.

The Virgin Islands supports many different species of birds by providing excellent nesting sites. The steep rocky shoreline

areas provide excellent habitat and safety for sea bird rookeries. However, a rookery is extremely vulnerable since the slightest disturbance from any source may cause the birds to abandon the area. Further, the islands are an important migratory nesting stop for a wide variety of songbirds and wading birds. Songbirds utilize the lush trees and shrub vegetation for feeding and roosting during their winter stops. Wading birds forage for food along the beaches and coastal flats around the lagoons during their winter migration. The pocket beaches nestled in the many isolated small bays and inlets provide excellent turtle nesting habitats for the threatened Leatherback, Hawksbill and endangered Green Turtle. Unfortunately, the frequency of nesting has been declining over the past decade, due to a combination of coastal development, loss of off-shore seagrass beds (a favorite foraging base for turtles), and increased human use of the near-shore marine environment (Boulton, 1990).

There is an intimate relationship between shoreline areas (and the impact of development upon them) and the near-shore marine ecosystems, including coral reefs and seagrass beds.

BEACHES

Among the most valuable scenic, recreational, and development attractions of the Virgin Islands are its beaches and clear water. Additionally, the beaches are the islands' first line of defense against storms. Needless to say, these functions are increasing in conflict with one another. Beaches are constantly subject to forces that promote either deposition or erosion of beach material. The influence of wind, waves, currents, and tides varies with location, resulting in observable differences in the slope, width, and material composition of shoreline around the various islands and cays. For example, narrow, steeply-sloped beaches consisting of marbles or coarse sand are associated with windward aspects, and wide beaches of finer grain sand with leeward condition. Over the long term, deposition and erosion are balanced.

The beach proper is functionally linked to the offshore reef system and the shoreline. The reef provides a source of beach material for the deposition and wave break which prevents erosion; the shoreline ridge system, in turn, is built from beach material.

The beach ridge, where it exists, serves two critical functions: (1) sand storage and (2) as a physical barrier to storm-generated waves (Multer and Gerhard, 1980). Under exceptionally strong wave battering, ridge sand may replace beach sand lost through erosion. Shoreline vegetation stabilizes ridge sand, helping to prevent it from blowing or washing away, as well as contributing a physical barrier to storm-generated wind and waves, and providing habitat for migrant and resident birds and other animals.

CORAL REEFS

Coral reefs are common features of the islands' coastal zones and have fundamental, environmental, and economic value. Besides their intrinsic beauty, which is apparent only to the relatively few who observe them directly, they are important as produced sand for natural and man-made beach cover and for construction. As such, they represent one of the Territory's few naturally replaceable resources available for extraction. Reefs also provide protection for harbors, shorelines, and shore structures by abatement of waves and dissipation of their energy, which otherwise would be expended on the shore with great force. It is also important to note that reefs provide perhaps the largest portion of seafood presently harvested in the islands. Most species of fish consumed locally either live on the reefs or depend on them in some measure for their food. Lobsters, too, are taken primarily from the reef areas.

Attributes of reef areas include the following:

- Valuable production of marine life, including most species harvested for food;
- Scenic value for underwater recreation
- Educational value;
- Shore protection by sea abatement (energy absorption);
- Sand production; and
- Production of potentially valuable products, i.e. antibiotics, other drugs, sea urchins, and precious coral (Ogden and Gladfelter, eds., 1983).

Carbonate reefs are considered to be relatively susceptible to continued heavy siltation. Corals have a limited ability to cleanse themselves, but could expend too much energy in eliminating non-nutritive particles or may be literally smothered. Organic sediment, particularly, can deplete the oxygen supply to lethal levels. Siltation is closely related to turbidity, being caused by solid particles, and their effects may be difficult to separate. A great deal of siltation occurs during most dredging operations as finer particles settle slowly and, therefore, can continue for sometime after dredging and may occur at far removed sites. The effects of siltation can be catastrophic for sessile organisms. If the rate of fallout is too great, many sedentary organisms, particularly corals, are literally smothered if they cannot cleanse themselves rapidly enough (Ibid).

Sewage discharge adds a wide variety of ingredients to the water having a number of effects. The more obvious contributions of sewage are lower salinity, higher oxygen demand, higher levels of nutrients, turbidity, sediment, and toxic compounds.

SEAGRASS BEDS

Seagrass beds are highly productive ecosystems that occur in close association with coral reefs in shallow water. Seagrass provides food directly to grazing fish, turtles, and sea urchins, and becomes a food source as well as a complex community of organisms feeding upon plant detritus. Seagrass beds are also nursery areas for juveniles of commercially important fish and invertebrates. These "pastures of the sea" are vulnerable to dredging and anchor damage from boats. Once destroyed, the grass areas often take years to recover, if at all. It is estimated that as much as 50 percent of the original seagrass beds along the south shore and east end of St. Thomas have been destroyed (Boulon and Beets, 1990).

Most in-shore bay bottoms are covered with such pastures, as are some extensive areas outside the bays. The distribution of a marine pasture is controlled by a number of factors, including sediment quality and stability, depth, water clarity, currents, grazing by herbivorous animals, and, in some instances, factors which are not apparent (Ogden and Gladfelter eds., 1983). The pastures usually do not extend below 60 - 70 feet in depth. Their growth is interrupted in channels or other areas with swift currents, or in surge areas where the sediment is constantly tossed, for example, close to a beach.

In most bays that have been dredged, the marine pasture has not become reestablished for many years. In the case of Lindbergh Bay, 50 years have elapsed and a barren hole remains off the western portion of the beach (Boulon and Beets, 1990). Even small swatches cut by an anchor, a dredge, or a boat's propeller may remain bare for a year or longer.

The positive attributes and use options for seagrass bed areas include the following:

- Grass areas have mild capabilities for assimilating wastes, but good flushing of the overlying water is advantageous;
- Seagrass beds are usually associated with clear water, but can tolerate some increased turbidity; and
- Associated animals can remove silt incorporated in sediment from periodic flooding and "cleanse" the bottom (Ogden and Gladfelter eds., 1983).

The limitations and constraints in seagrass bed areas are:

- Once destroyed, marine pastures usually require many years to recover. Deep holes may never recover; and
- Since the community is dominated by plants, a critical minimum amount of light is needed. Chronic, heavy

turbidity is destructive (Ibid).

MANGROVES

Mangrove habitats are limited in the Virgin Islands, probably because of the lack of rivers or streams. The largest areas that did exist have been destroyed by filling for land development. Mangrove plants, in narrow strips along the coast, are fairly common, but well-developed mangrove forests and their associated marine nursery areas survive only at Jersey Bay on St. Thomas and Salt River on St. Croix (Island Resources Foundation, 1976).

Mangroves are flowering trees that can live in salt or brackish water. Several different types of trees are referred to by the common name "mangrove," but the most common are the red, white, and black mangrove. The red mangrove (*Rhizophora mangle*), known as "the plant that makes land," is the most typically recognized species. It grows at the water's edge, and new seedlings become established seaward. In addition to providing support and hiding places for a variety of marine animals, the prop root system of the plant traps sediments that accumulate from the plants or are washed down from land. By this process, the shoreline is slowly and naturally extended. Once the sediment becomes firmly established, the red mangroves die off naturally and are succeeded by other plants, initially black and then white mangroves. Mangroves, therefore, by their dense coverage and complex root structure at the shoreline, interrupt runoff from the land and help trap fresh water, sediment, and debris at the shoreline, thus protecting off-shore marine areas from these pollutants (Ogden and Gladfelter, 1983).

By their development, mangrove areas further promote sedimentation and quiet waters. In turn, expansion of mangrove growth is facilitated. Wildlife diversity in mangrove ecosystems is second only to the coral reefs, as far as the Virgin Islands is concerned (DPNR, Division of Fish and Wildlife, 1989). Considering that Jersey Bay is immediately adjacent to beautiful, rich reefs, this environment is an incomparable resource. But, the mangrove forests are by far the most noteworthy because only two such areas remain, while there are hundreds of fine reefs. Possibly because reefs have attracted more attention, a process has begun to construct additional artificial reefs. An attempt has not yet been made to construct a mangrove lagoon.

The large numbers of fishes, birds, crustaceans, and other animals that live in a mangrove area are dependent basically on the nutrients and vegetable matter produced from the leaves of mangroves and seagrasses. This material is eaten by vegetarian and omnivorous animals. Their excrement and the organic matter from rotting of other leaf litter provide food for plankton and bacteria. These, in turn, are eaten by larger animals, included those harvested by man.

Large mangrove areas provide home and food for thousands of plants and animals. Numerous types of birds roost, feed, and nest in and around the mangroves. Among the more important of these are doves and pigeons, pelicans, and the osprey or fish hawk. The cattle egret also roosts and nests in mangroves, although it makes a daily inland trip to feed on insects near cattle. Some of the Territory's rarer species of reptiles are also found in mangroves, very possibly because they are less accessible to predation by humans, mongooses, and domestic animals. Other than marine life, the main wildlife value of the mangroves is as a habitat for birds. Jersey Bay Lagoon is a major habitat for approximately 20 species of herons, egrets, grebes, gallinules, mountain doves, white crowned pigeons, and Bahamas pintail ducks (DPNR, Division of Fish and Wildlife, 1989).

The following factors identify some of the unique and characteristic physical and biological aspects of mangrove ecosystems that account for their high intrinsic value and productivity (Ogden and Gladfelter, eds., 1983):

- Energy production (food supply) is high for mangroves, grasses, and plankton;
- Protection from strong waves and swells creates quiet water;
- Relatively rapid sediment deposition via plant litter, biogenic sand, and terrigenous silt.
- A wide variety of habitats and niches, including shoreline forest, prop root zone, bare sand, muddy areas, algal beds, seagrass meadows, and coral areas;
- These areas usually receive some degree of periodic freshwater inflow;
- They are subject to greater spatial and temporal salinity variation than other coastal zones (except for salt ponds);
- Shallow depths, quiet waters, and secluded restricts larger predators (sharks, etc.);
- They are usually backed upland by flat floodplains or tidal marshes of black and white mangroves, button wood, marsh plants, etc., that afford protection from excessive siltation; and
- Because of the wide variety of environmental conditions and ecological niches in a rather small area mangrove forests are characterized by an unusually wide variety of wildlife, particularly marine life and birds.

SALT PONDS

Most salt ponds are isolated former bays or parts of a bay (Island Resources Foundation, 1977). Over time, they have become closed by reef or mangrove growth across the bay. The closure may be

accelerated by sand and rubble tossed up on the shallow closing bank by storms. They may receive outside bay water slowly by percolation through the berm, if it is porous enough. Evaporation in a closed pond, if not replenished from the bay or rain water, will dry up completely, leaving crystallized salt on the surface.

Occasionally, a pond berm will be breached by a stormwater from the land or sea. When this occurs, the pond can be reinvaded by marine animals, usually crabs and fish. These will die off as the pond recloses and salinity increases again.

The environment of a salt pond is very specialized and limited compared to that of the adjacent bay, but its ecology is complex and dynamic. Common animals are fiddler crabs and larger land crabs. Several kinds of insects that prefer saline environments live or breed in salt pond, including flies and many varieties of midges. Mosquitoes may breed there during brief periods when heavy rains lower the salinity sufficiently. Several kinds of microscopic algae float in the water, at times giving it a green, pink, orange, brown, or red color. Other micro-algae grow as mats on the shallow margins. A number of wading birds (stilts, sandpipers), etc.) feed along the edges of the pond on crabs, insect larvae and other small animals. Salt ponds frequently contain large numbers of brine shrimp that is in great demand throughout the world as food for aquarium fish, aquaculture and research organisms. Thick blooms of these shrimp can give the pond water a brownish-pink tinge. If the pond is or has been recently open, it will contain fish (sennet, small barracuda, mullet, tarpon, snook, etc.) and marine crabs. These are fed upon by kingfishers, herons, and ospreys. Kingbirds, martins, and swallows frequently feed on flying insects over the water.

The local animals and plants associated with salt ponds are not well known, and the complex ecology of the ponds can only be inferred in simple outline. They have never been studied properly (Ibid). It is known that salinity changes over a very wide range.

It may be concentrated to more than three times that of the sea water (over 100 parts per thousand) or be depressed by heavy flooding to almost freshwater (depending on the volume of flood water, the size of the pond and the permeability of the pond-bay barrier). Periodic changes of even one-third of this magnitude will cause significant changes in the types and numbers of organisms inhabiting the pond. Slow changes, as by evaporation concentrating the salt, promote a gradual die-off of some forms of animal life and a gradual invasion and development of others. There is a constant, slow modification of the natural community in response to this change.

Sudden changes in salinity, caused by flood water for example, results in catastrophic changes in the biota. masses of halophilic (salt-loving) forms are killed while other types, suited to the new, less saline environment, quickly invade the pond and become established. Following heavy flooding, many ponds

contain great amounts of dead halophilic algae, insects, etc. These often account for the occasionally bad order found in a pond.

Other environmental characteristics of salt ponds are high concentrations of hydrogen sulfide, especially in the sediments (from the decay of dead organic matter); high temperature (from insulation with lack of shade); low dissolved oxygen from high temperature, salinity and biological oxygen demand (B.O.D.), and high turbidity from large concentrations of land and pond-derived solids.

Although no specific data are available, it is safe to assume that ponds also contain higher concentrations of most pollutants than, for example, their adjacent associated bays (Ibid). This is likely because of the natural ecosystem function of salt ponds as buffer zones and sumps. As they are located between the bay and its upland watershed, they receive and trap most of the runoff from the land, thus protecting the bay.

Sediment coring in several local ponds have revealed thick layers of terrigenous (land-derived) mud and silt interbedded with layers of organic muck, algal mata and occasional sand lenses. The latter may have been deposited when a hurricane or other violent storm broke open the pond or threw waves over the berm, bringing sea sand into the pond. Somewhere at the bottom (depending on the age and depth of the pond) lies the original bay bottom and below that, bedrock.

Because most of the upper layers of pond sediment are highly organic and have been anaerobically decomposed, disturbing these sediments usually releases obnoxious sulfide odors. When these materials are dispersed, they use up the available oxygen rapidly. this can kill animals and the water (Ibid).

The following are uses and limitations of salt ponds in the Virgin Islands:

Attributes/Use Options

- Act as natural catchment and settling basins to protect marine resources;
- Provide feeding places for wading birds, insects and fish-eating birds;
- Low in dissolved oxygen, frequently less than four parts per thousand; and
- Biota limited to a few organisms that are tolerant of high and changeable salinity.

Use Limitations

Use constraints include, but are not necessarily limited to, the

following:

- Sediments unstable for foundations, pilings almost always required;
- Sediments - fine, toxic, and with high oxygen demand - can be dangerous to adjacent marine biota if released;
- Modification may adversely alter drainage and runoff patterns;
- If filled, the weight of overburden may, depending on the nature of pond sediments, extrude these sediments at certain points. Overburden may be plastic;
- Nature of sediments may limit use of deep-rooted vegetation on overfill; and
- Modification will alter or destroy habitat for associated birds (Ibid).

Tolerances of the system appear to be wide, but this is due largely to a lack of knowledge about the functioning system. All systems and their components have tolerance limits. Obviously, massive inputs of toxic materials will destroy the ability of the system to function. Filling a pond will completely destroy its function as a catchment basin and aquatic habitat. Opening it to the sea will significantly change its ecological function and perhaps that of the adjacent bay.

AGRICULTURALLY SUITABLE LANDS

The decline of the agricultural industry in the Virgin Islands culminated with the demise of sugar cane growing and processing after World War II. Resources and attention began to concentrate on the nurturance and expansion of tourism, manufacturing, and retail merchandising at the expense of agriculture. At the same time, suburbanization of prime agricultural lands gradually depleted the most fundamental resource for agricultural development. This situation has been reinforced by the fact that the best agricultural land, is often well suited for development.

Since the 1960s town residents were increasingly drawn to the attractions of country lifestyles. Their growing numbers began to require the extension of public services and better roads. More dense development and commercial uses soon followed, often with limited land use controls.

The movement of scattered development into agricultural areas set a precedent for future encroachment over a much larger area. Conflicts arose between agricultural use and residential development. Continued urbanization escalated land values, making it more difficult and expensive to maintain viable agricultural operations. Subdivisions of property occurred that altered the traditional land tenure pattern and produced smaller parcels. What is left of agriculturally suitable land remains idle and out of production.

The changes in land use patterns have caused remaining farmers to question the viability of their operations, and continue to encourage the conversion of farming operations (Padua, 1984; 1990). As capital investment is reduced, agricultural support services close or convert to landscaping and maintenance services.

The economic viability of agricultural production in the Territory is threatened by a number of constraints. These include:

- Shortages of water during certain times of the year;
- The unavailability of land for use by agricultural producers;
- A tight agricultural labor supply;
- The high cost and lack of dependable maintenance service for farm machinery;
- The high cost and local unavailability of agricultural inputs;
- A limited number of younger practicing farmers; and
- A reluctance by farmers to utilize new technological advances. (Ibid.)

Ironically, the need for agricultural production is increasingly evident. The high cost of importing food products and the stability of economic diversification tend to make the case for increasing agricultural production.

The potential for agricultural production and marketing exists in several areas. Small scale vegetable production is feasible on all three islands. Terrace farming of vegetables, fruits, specialty crops, and controlled environmental crop production are more suitable methods of farming for St. John and St. Thomas. Expansion opportunities exist for ornamental horticulture and foliage plant nurseries. Poultry farming and small livestock production are already being practiced.

The topography and excellent soils of St. Croix offer the greatest opportunities for large scale agricultural production. Animal husbandry is the most viable agricultural enterprise in the islands at the present time. However, the high cost of feed grains hampers the continued expansion of this business. New grain types (e.g. sorghum) have been shown to adapt very well to land that was formerly used for sugar cane (Ibid). Expansion on a larger scale could provide food for increased local livestock and poultry production, as well as provide food for exporting to neighboring islands.

Considerable potential also exists for commercial production of food crops and fish for domestic use as well as export. Examples include tropical fruits, flowers, grapes, avocado, yams, aloe (for pharmaceutical products) jojoba, and sunflower for industry purposes (Ibid). Growth in the agricultural sector, and

agricultural self-sufficiency, is incumbent upon strong agricultural policy-making by the territorial Government. One of the key objectives of the Guidelines, the foundation of the CLWUP, is the preservation and management of land suitable for long-term agricultural use. The primary strategy to implement this objective was to "protect prime agricultural areas from urbanization."

Therefore, one of the underlying criteria used in the development of the Comprehensive Land and Water Use Plan has been the protection of agriculturally suitable soils, as identified by the U.S Soil Conservation Survey. The depiction of these areas are displayed on the soils maps for each island contained in Technical Document I. These areas, primarily on St. Croix, have been designated for intensities of use consistent with agricultural production and related activities, where not otherwise subdivided or presently subject to development pressures.

GROUNDWATER RESOURCES

As rapid population growth and development over the last 30 years have taxed the Territory's natural resources, the availability of reliable sources of water has become a critical issue facing planners in the Virgin Islands. The public water system relies heavily on desalinated water, which results in a high cost to the consumer. Most Virgin Islanders outside of the public water distribution system depend on rainfall catchment, but there are many years when rainfall in all parts of the Territory is not sufficient to satisfy the needs of these residents (Smith, 1986).

The geologic formations of the Virgin islands are not generally porous enough for the storage of large quantities of underground water (USGS, 1987). As is characteristic of most islands, there are limited amounts of fresh groundwater, and freshwater aquifers are susceptible to changes in quality due to encroachment by saltwater. Nevertheless, there are several areas on St. Croix, St. Thomas and St. John where significant quantities of groundwater have been identified and developed (Canoy, et al, 1985).

Overall, groundwater provides about 20 percent of the territorial freshwater supply (USGS, 1987). At the present time, groundwater is estimated to provide approximately one-third of the potable water distributed by WAPA on St. Croix. In addition, there are several hundred privately owned wells on St. Croix that are pumped for domestic, agricultural and industrial purposes, and several commercial well-field operators pump and truck groundwater for sale to cistern users (Cipriani, 1990). On St. Thomas, all of the water distributed by WAPA is derived from desalination plants. There are also numerous private wells that are pumped for various uses on St. Thomas and St. John, and on St. Thomas there are several commercial well-field operators that pump and sell

significant quantities of groundwater. One well-field provides groundwater for public supply on St. John.

The importance of groundwater protection highlights the connection between land and water management. Human activities on land significantly affect the availability and quality of groundwater resources. Effective conservation and protection of groundwater requires appropriate attention to land management. The territorial Government, through its authority to regulate land use and development, must play a key role in the overall scheme of groundwater protection.

There are two important planning functions to consider relative to groundwater protection:

1) Groundwater Recharge -- In the Virgin Islands, aquifer recharge is primarily a function of rainfall. Generally, the western windward ends of the islands receive more rainfall, contributing to the lush tropical vegetation than their eastern counterparts where xeric vegetation predominates. Protecting the recharge function is a geographical factor in the Territory. Elevation also plays an important role by inducing orographic rainfall. The western and more mountainous areas of the islands, especially on St. Thomas and St. Croix, are the major recipients of this precipitation. Significant consideration should be given to the conservation of these areas, given the environmental and physical characteristics that include steep slopes, heavy stormwater runoff, important wildlife habitat, and lack of public services.

2) Wellfield Protection -- Many of the Virgin Islands public, commercial, and domestic water wells are located in areas not necessarily of high aquifer recharge value. The movement of groundwater through underground geologic strata (cracks, fracture zones, faults, and loose alluvial deposits) often places it at a different end-point than its initial point of entry into the ground through precipitation, evapotranspiration, or percolation. Many of these wellfields are located in areas of intensive human occupancy. They are often subject to contamination from adverse development impact, including pollution and over pumping. Therefore, protection should be given to existing and potential wellfield areas to preclude these impacts.

Traditionally, efforts to manage groundwater has been reactive, triggered only when problems occur. But, because of the nature of groundwater resources, negative impacts can be irreversible or prohibitively expensive to remedy. Prevention of contamination is the key to effective groundwater management.

Potable groundwater supplies are at risk from a variety of contaminants which may be introduced into aquifers by human

activities. Common groundwater contaminants include inorganic substances, such as nitrates, salts and heavy metals; organic chemicals, including fertilizers, pesticides, solvents and petroleum distillates; microbial contaminants, such as viruses, bacteria, and parasites; and radioactive materials (Jaffe and Dinovo, 1987).

Groundwater pollution may be classified as originating from either point or non-point sources. Point sources are discrete, known locations. Examples include landfills, wells, leaking underground storage tanks, wastewater disposal facilities, chemical disposal or use sites, and industrial waste outfalls. Non-point sources introduce pollution over a larger area. Examples include the application of agricultural chemicals, areas where agricultural wastes are stockpiled, and areas served by on-site wastewater systems (e.g., septic tanks).

Septic tank systems and leaking public sewer lines present the greatest threat to groundwater from residential land-use activities (CH2M Hill, 1983; Geraghty and Miller, 1983). Sufficient systems must be employed to adequately treat household wastewater flows through the Territory's thin soil layers. Commercial and industrial land uses vary widely in the threats they present to groundwater. Retail businesses that are potentially troublesome include dry cleaning establishments and gasoline stations.

According to the Groundwater Management Plan for the U.S. Virgin Islands (Geraghty and Miller, 1983), the groundwater from many public supply and commercial wells in the Virgin Islands does not comply with established standards for drinking water. The natural groundwater quality is relatively poor and several wellfields have been contaminated by sewage, saltwater intrusion, or other types of pollution. Several wellfields have been contaminated to the extent that the water pumped from these areas may present a health hazard. In addition, well construction practices currently employed in the Virgin Islands may present a contamination threat to key aquifers.

Operational and abandoned wells provide direct pathways into key aquifers for contamination that originates in surface water runoff, from leaking sewer lines, septic tanks, or commercial and industrial sources.

The availability of water will become a more critical issue facing Virgin Islanders as population and development increase. Maximum utilization of the available groundwater resources can aid in reducing the average cost of water to the consumer. Maximum benefits of groundwater can only be derived from proper management and protection of aquifers and well-fields to insure the long-range availability of this resource and to protect the health of consumers.

The Comprehensive Land and Water Use Plan serves to protect the integrity of the Territory's groundwater resources through implementation of well-field protection regulations in the V.I. Development Law and through designation of potential groundwater resource areas. These areas should be protected from development activities that could adversely impact the Territory's aquifers and well-fields. These areas are identified on the Potential Groundwater Exploration Areas maps for each island in Technical Document I.

AREAS OF PARTICULAR CONCERN/AREAS FOR PRESERVATION AND RESTORATION

The Virgin Islands Coastal Zone Management Act, adopted in 1978, has served as the Territory's guide for planning and managing the use of coastal areas over the last decade. In addition to recognizing the importance of the entire coastal zone, the CZM Act stipulates that certain areas are of even greater significance, whether for economic, cultural, or environmental reasons, and are nominated as Areas of Particular Concern (APCs). Further, the Act requires that management programs be implemented with procedures, whereby specific areas may be designated for the purpose of preserving or restoring them for conservation, recreational, ecological, or aesthetic values. These have been termed Areas for Preservation and Restoration (APRs).

As a part of the Coastal Zone Management Program (CZM), the Virgin Islands Government has developed the criteria for 18 areas that are nominated as being of particular concern.

Significant Natural Areas (SNAs)

These areas are unique, scarce, or fragile natural habitats or physical features; areas of high natural productivity; or essential habitat for living resources or endangered species, including fish and wildlife and various levels of the food chain critical to their survival. Examples of the SNAs are unique or remnant plant and animal species of special interest; natural areas that provide scientific and educational value; and areas necessary for wildlife for the nesting, spawning, rearing of young, or resting during migration. Also included are areas needed for the protection, maintenance, or replenishment of coastal lands and resources.

Culturally Important Areas

These are coastal lands and waters where sites of historic and archeological significance, cultural or traditional value, or scenic importance are located.

Recreational Areas

These include lands and waters of substantial recreational value and/or opportunity. Examples include areas suited for public parks, beaches, boat launching and mooring, and other recreational activities.

Prime Industrial and Commercial Areas

This designation reflects coastal lands and water with existing or potential geologic, topographic, and infrastructural conditions amenable to industrial and commercial development, especially those requiring a waterfront location.

Developed Areas

These are urbanized or highly populated and intensively developed areas, where shoreline utilization and water uses are highly competitive or are in conflict.

Hazard Areas

These include coastal locations that, if developed, would pose hazards because of periodic flooding, storms, erosion, or land settlement.

Mineral Resources

These are coastal areas with existing or potentially important mineral resources, particularly sand deposits for commercial extraction.

Based on a technical review by the government and extensive public review and input, eighteen land and water areas were designated as Areas of Particular Concern (APCs) and Areas for Preservation and Restoration (APRs). Most of these are either sites of significant natural value and importance, or developing or already developed areas where restoration, public or private investment, protection, or other actions are needed. Some of these are well-suited for economic development and investment.

Guidance for the management of both APCs and APRs is generally outlined in the CZM Act. However, more specific plans must be developed to implement adequate management measures for certain APCs and APRs. The boundaries of each APC and APR are incorporated in the Comprehensive Land and Water Use Plan and have been designated for land and water use intensities that reflect the unique characteristics and initial recommendations made for the management of these areas as part of the CZM program.

In addition to the APCs and APRs designated by the CZM program, the Department of Planning and Natural Resources (DPNR) has identified SNAs which reflect important or unique lands suited to

wildlife habitat, or have significant aesthetic or functional resource value. Several of these SNAs have been designated for many of the small off-shore islands and cays. in most cases, these are relatively undeveloped areas of flora and fauna, and are subject to special consideration and preservation for environmental or recreational purposes.

A complete listing of the APCs and SNAs which were utilized in the designation of these areas on the Comprehensive Land and Water Use Plan are listed in Appendix B. The Areas of Particular Concern and Significant Natural Areas maps for each island contained in Technical Document I illustrate these sites.

HOW DO WE GET WHAT WE WANT?: PROCESS

The proposed Comprehensive Land and Water Use Plan and accompanying V.I. Development Law are the result of considerable analysis performed by the Department of Planning and Natural Resources and its consultant. The existing zoning regulations are 20 years old and contain major weaknesses. These weaknesses have been reduced or eliminated by the Comprehensive Land and Water Use Plan and V.I. Development Law.

Approach

Traditionally, land use planning in the Territory has taken the form of maps with areas blocked out and designated for residential, commercial, industrial, agricultural, institutional, and open space uses. Within each of these categories, the following is the normal range of activities that would occur:

- Residential:** Single-family detached homes, two-family houses, apartments, townhouses, patio homes, condominiums.
- Commercial:** Retail stores and shops, restaurants, banks, neighborhood convenience stores, supermarkets, shopping centers, gas stations.
- Industrial:** Manufacturing operations, oil refineries, warehousing, trucking terminals, airports.
- Agricultural:** Forests, grazing or pasture land, crops, landscape nurseries, greenhouses.
- Institutional:** Offices, schools, hospitals, clinics, museums, libraries, police and fire stations, universities.
- Open Space:** Recreational facilities, parks, and

conservation/preservation
areas.

The present approach to planning in the Territory tends to be too restrictive on the different kinds of uses that would be allowed in an area. With the exception of agricultural and industrial uses, this a problem especially in a small island environment. Examples of how this approach would be applied in the Territory might be helpful. A plan could be prepared for St. Croix that would indicate that most of the land on both sides of the Queen Mary Highway (Centerline Road) should be developed in residential use. As St. Croix grows, however, it is probable that there will be an increased demand for neighborhood convenience stores, and that a prime location for this type of use would be adjacent to the road.

At the time that the plan is being prepared, it would be impossible to know what site along this route would be most appropriate for this specific use. On St. Croix, there are large residential communities that do not have support services such as convenience stores, schools, recreation areas, etc. Therefore, someone who would want to build this type of facility would have to go to the government and legislature to get the plan and zoning code amended. This is a time-consuming process for the individual and government officials, and does not really take into account the continually changing economic conditions on the island.

Similar scenarios could be played out along Black Point Road on St. Thomas and along Southside Road of St. John. In these cases, the same time-consuming process described above would have to be employed. Anyone wanting to develop his or her land in a manner that does not conform to the existing regulations, although it may be the most appropriate use for the area, would have to face the lengthy amendment process.

The process that is being proposed in the place of the standard land-planning method is much more flexible in being able to respond to the needs of the community, including changing market forces, but still provides the people and government officials with an effective tool for growth management. The land use intensity system assumes that certain uses have about the same impact on the land, such as residential, commercial, and office uses. It is also assumes that if these activities were to be built one besides the other, with "good design" standards, they would not adversely impact each other.

Specific criteria have been developed that serve as the foundation of the Plan in its designation of land and water uses. These criteria are derived from the analysis for existing conditions in the islands, a synthesizing of the issues expressed during the citizen participation phase of the planning process, and the implementation of planning strategies to address these issues and

concerns.

The Intensity Districts were created to achieve important goals or to maintain areas with distinctive character. There are also districts that are use-oriented; and there are others where the use (e.g., agricultural and industrial) has special locational needs, unique nuisance factors, or very different relationships with other land uses.

Further, this system is particularly appropriate in areas that are sensitive to development, such as floodplains or steep slopes. For the process to work properly, performance standards must be developed in concert with the Intensity Districts. This must be done, for it is not only the particular use of the land that is important, but how that use takes place with respect to off-street parking, landscaping, buffering, slope treatment, etc., that is critical as well.

Planning Framework

The following form the foundation from which the plans were developed:

- Guidelines For The Development of a Long Range Comprehensive Plan;
- Recognition of natural constraints such as floodplains, steep slopes, and ecologically sensitive areas;
- Availability of existing infrastructure;
- Respect of approved, but as yet unbuilt development;
- Community expression.

Intensity Districts

The Intensity Districts were created to achieve important goals and to maintain areas with distinctive character. There are also districts that are use-oriented; and there are others where the use (e.g., agriculture or industrial) has special locational needs, unique nuisance factors, or very different relationships with other land uses.

The proposed intensity districts are developed to achieve important land and water use goals or to maintain areas which have distinctive character. Each of the proposed intensity districts and their associated uses are described in detail in this section.

LAND BASED DISTRICTS

District A: Agriculture

This district includes areas with soils suited for agriculture production, significant volume of ground water, rich vegetation, or contributes to the recharging of aquifers. It is established as an exclusive district in which agricultural uses and those uses which are a necessary and integral part of large-scale agricultural operations are the principal uses of land.

District 1: Conservation

This district includes undeveloped and sparsely-developed areas which are environmentally constrained, lack adequate infrastructure and are not subdivided for residential or commercial development. Very limited residential development is accommodated in this district. Those areas with soils especially well suited to agriculture are also included, and performance standards would restrict development in certain natural resource areas. Protective measures to ensure that the natural functions of environmentally sensitive areas such as salt ponds, very steep slopes, wetlands, beaches, floodplains, mangroves and potable water wellfield areas are maintained would be provided.

District 2: Low Density

This district primarily includes sparsely developed and undeveloped areas and outlying subdivisions that are located outside the service district for existing sewer and water lines. These areas are generously serviced by collector roadways and lots typically front on local streets. District 2 accommodates low-density residential neighborhoods with active and passive recreational facilities, and neighborhood-oriented commercial activities. This district also encourages small-scale crop farming and provides for a range of public services.

District 3: Moderate Density

This district primarily includes areas that are serviced by public sewer and potable water lines, and are accessed by minor arterial and collector roadways. Large residential subdivisions and some commercial development typically occur in these areas. This district accommodates medium-density residential development, limited offices, active and passive recreational facilities, smaller-scale hotels, as well as community and neighborhood oriented commercial facilities.

District 4: High Density

This district includes moderate- to densely-developed areas that function as secondary town centers outside the traditional towns. They are located primarily on a major and minor arterial highways and are comprised of moderate- to high-density residential development and a full range of commercial activities. Typically, these areas are serviced by both public sewer and potable water facilities.

District 5: Urban

This district includes the traditional towns characterized by high-intensity residential, commercial and other central business district functions that provide a full range of pedestrian-oriented commercial activities and urban services. This district does not include highway-oriented commercial activities such as supermarkets and shopping centers.

DISTRICT 6: Industrial

This is primarily an industrial, heavy commercial and major utility area.

WATER DISTRICTS

District 1W: Waterfront Conservation

This district is comprised of all Territorial waters and submerged lands not otherwise zoned. Water areas in this district include commercial fishing areas, recreational beaches, navigational lanes, and ecologically sensitive areas such as seagrass beds and coral reefs.

District 2W: Waterfront--Low Density

This district accommodates limited vessel storage for full-time commercial fishermen, research institutions, research facilities, and public access docks.

District 3W: Waterfront--Moderate Density

This district primarily accommodates the storage of vessels in the Territorial waters of the Virgin Islands.

District 4W: Waterfront--High Density

This district permits a full range of activities associated with the storage, marketing, repair, and outfitting of pleasure craft.

District 6W: Waterfront Industrial

This district is typically associated with industrial and cruise port facilities, as well as marinas and the land-based facilities

associated with them.

**PART II: LAND AND WATER USE
PLAN**

ST. THOMAS LAND AND WATER USE PLAN

Existing Land Use Patterns

St. Thomas' economy was historically based largely on shipping and trade. The rugged mountainous terrain did not lend itself to the establishment of large-scale sugar cane production, as was the case on St. Croix. The center of population was concentrated in the old colonial city of Charlotte Amalie. The hub of the island, it was a busy international port city with a rich mix of people and cultures from around the world which gave the island a cosmopolitan flavor. The rural portions of the island contained scattered settlements, some based on small-scale agricultural production.

Commerce has been the centerpiece of St. Thomas' economy over the past centuries. Since the island's hilly terrain impeded large scale agricultural cultivation, the harbor became the most important player in the local economy. Additionally, the commercial importance of St. Thomas stemmed from its central position for American and European shipping lines whose vessels delivered freight to the different islands of the Caribbean. Warehouses were built in Charlotte Amalie to store cargo which was to be reloaded into smaller vessels. As a result, Charlotte Amalie became the town on St. Thomas, with a large concentration of the island's population.

The decline of the shipping industry in the 1800s did not affect population distribution on St. Thomas. Charlotte Amalie retained its economic prominence, as well as the bulk of the island's population. The town was a self-contained enclave with grocery stores, shoe repair shops, rum shops, and restaurants located within walking distance of each other and from the residences. Moreover, many buildings had mixed uses, housing the owners upstairs, and shops or other business ventures downstairs. Thus, the town functioned as a community with widespread social interaction.

During this time the Virgin Islands had no land development controls. As a result, many areas of the island developed with commercial, light industrial, and other non-residential uses scattered in residential neighborhoods. Good flat acreage was scarce and developments tended to locate close together to take advantage of the available, easily developed land.

Through the World War II era, neighborhoods functioned as communities, exhibiting strong social cohesion. Extended families lived in close proximity to one another. The grocery store, laundromat, movie theater, shoe repair shop, and cafe were usually incorporated within the residential neighborhood, reinforcing a strong "sense of place" and identity for its occupants. This

mixed-use pattern of land development originated in Charlotte Amalie where land was limited and commercial activity was needed to serve the local residents. It was a period when few residents could afford automobiles. Owning a car was not a necessity for most residents, since shopping and working places were located close by, and rural neighborhoods provided similar services.

The creation of the Virgin Islands Corporation (VICORP) in 1939 began to alter the existing development pattern because it promoted economic and industrial development outside Charlotte Amalie. For example, Bluebeard's Castle Hotel was constructed as part of a program to foster tourism on St. Thomas. This and other development activities made far reaching incursions into areas that once were pristine environments and broke the traditional ties between place of work and residence.

Following the Second World War, federally subsidized roads, housing, schools, other infrastructure, and local government business incentives encouraged development in rural areas. As island residents began to relocate to any site or building that was available for residential use, and developers sought to take advantage of an expanding tourism industry by developing hotels and other related business outside of Charlotte Amalie, the existing social patterns were disrupted and a society dependent on automobiles evolved. New neighborhoods evolved without stores and shops to serve residents, or without recreational facilities. This development pattern gradually dispersed the island's population, and the number of people residing in Charlotte Amalie decreased from 79.5 percent to 42.9 percent in 1970.

The Cuban revolution also had a tremendous impact on existing development patterns in the Virgin islands. After the revolution, St. Thomas and St. John became popular vacation destinations. The number of cruise ships entering St. Thomas' harbor increased from 74 in 1951, to 157 in 1961. Hotels and other resorts were constructed to attract visitors. The surge in construction activities led to labor shortages and subsequent heavy immigration from neighboring Caribbean islands, the U.S mainland, and Europe to supply the demand.

By 1970, the population of St. Thomas had more than doubled to 37,285. Ten years later in 1980, the population reached 45,000. Between 1960 and 1980 population density increased on St. Thomas from 500 to 1,400 persons per square mile. Rapid increases in school enrollment, automobiles, and new housing units were experienced throughout the island. Today, even though the population remains stable at about 45,000 over the past decade, population density exceeds 2,000 persons per square mile on the island. However, as the overall population has increased tremendously, island-wide residential density has actually decreased since 1960, as previously undeveloped hillside areas saw large lot detached single-family homes constructed.

Due to population pressure and crowding, development moved quickly up the steep slopes. Aided by the adoption of mainland-styles zoning laws and federally financed highway construction, a dispersed development pattern of low density detached housing has appeared. A strong economy boosted per capita income to among the highest in the Caribbean. More people can afford cars and their own homes. As the automobile became readily available, people now drove to work, the grocery store, and the movie theater; and the perceived need for mixed-land uses diminished.

Many residents settled in large scale single family residential developments such as Tutu. Large commercial centers such as Four Winds Plaza were built to serve the increased population in these areas. Residents commute by car to Charlotte Amalie, which remains the major employment center, while their children are bused to the junior and senior high schools. As a result, communities have tended to lose their "sense of place" and the quality of life has begun to deteriorate.

Demand for home ownership has increased among both permanent and seasonal residents. Escalating land costs and a limited supply of easily developed land has created a pattern of very small lots. To maximize economic gain for these parcels, buildings and homes have begun to grow vertically rather than horizontally. This construction method maximizes scenic views, takes advantage of steep slopes, and often provides additional rental units and income potential for the homeowner. It is not uncommon to see two-, three-, and even four-story homes built for these reasons.

Historically, development in the urban area (with mixed land uses and higher densities) generally consumed less land and could more easily be provided with public services, such as schools, police and fire protection, and sewer and water facilities. However, as growth pushed away from the towns and spread into the country, the limited public services and infrastructure in the rural areas quickly became overburdened and were not able to keep pace with growth. New roads and lot zoning broke up parcels of land and spread out population over a wide area. In some cases, development has occurred in areas less suitable for growth such as floodplains (Bovoni), steep slopes (Donoe), and significant natural areas (Mangrove Lagoon). At the same time, dredging activities, the filling of submerged land, the release of untreated sewage, and increased sedimentation from construction projects have led to the loss of critical marine resources such as coral reefs, seagrass beds, and mangroves. This improper use of St. Thomas' land and resources translates into higher cost and greater difficulty in providing public services necessary to meet the needs of the people. This is witnessed today by traffic jams, power outages, water pollution caused by inefficient sewer and water treatment systems, periodic communication breakdowns, loss of public access to beachfront areas, overcrowded school, and

diminished recreational facilities.

In addition, portions of the Charlotte Amalie area, such as Savan, have experienced urban blight. As some people moved out of town and into the country side, historic neighborhoods began to decline, property values fell, and housing stock deteriorated. These are indicative of some of the social costs of rapid and uncontrolled growth. It is to be noted that, although reinvestment has been made and probably will continue to be made in Savan, because there has been virtually no planning to guide the development of the neighborhood, it is in a continuing state of decline.

To accommodate future growth and still provide the quality of life desired by St. Thomians, comprehensive development planning is essential. For the past 20 years, the Territory has regulated land development through a zoning ordinance without an up-to-date plan to guide the rezoning process and the necessary provision of public services. The people of St. Thomas have expressed a desire for organized growth and change in response to these conditions.

Land Demand Analysis

Based on the projected population growth between 1990 and 2000, an analysis of the future demand for residential, hotels and resorts, commercial, industrial, agricultural, parks and recreation uses can be made. The following table projects the anticipated population growth for St. Thomas to the turn of the century.

Table 1 Resident Population Projections, St. Thomas: 1991 - 2000

Year	Population	Additional Growth
1970*	37,285	
1980	44,372	
1990	48,166	621
1991	48,787	629
1992	49,415	637
1993	50,052	645
1994	50,697	653
1995	51,350	662
1996	52,012	670
1997	52,682	679
1998	53,361	688
1999	54,048	696
2000	54,745	705

Sources: Department of Commerce, Bureau of the Census. Census of Population, 1989, 1990.
 Note: 1991 - 2000 estimates were computed using 1970 (adjusted) - 1990 growth rate.
 *There are concerns that the 1970 Census population data for St. Thomas was inaccurate.
 Table 1 reflects adjusted 1970 population figures commonly accepted in the Territory.

That first step performed in this exercise was to determine how much land is currently being used in the various land use categories. Calculations were made from the existing land use map prepared by Island Resources Foundation in 1989. These data revealed that about 8,609 of the 17,751 acres that make up the island of St. Thomas, or approximately half of the land area, is currently being utilized or occupied with some use. Of this, approximately 4,750 acres, or 55 percent, of the land that has been developed, is calculated as being in residential use. About 250 acres is in retail/commercial use, not including the stores and shops in downtown Charlotte Amalie. This area, which occupies about 360 acres and includes businesses, hotel, office, some housing, parks, and a limited amount of warehousing and storage space has been designated as Urban on the Existing Land Use Map. Resorts and hotels occupy about 250 acres of land, while the public facilities and institutions on the island (schools, hospitals, the University of the Virgin Islands, etc.) currently claim approximately 750 acres. Industrial and manufacturing uses amount to slightly less than 200 acres at the present time. Parks and recreational facilities occupy about 300 acres. Agricultural activities occupy 1,620 acres, or about 9 percent of St Thomas' land area.

There are approximately 9,150 acres of vacant or undeveloped land on St. Thomas. The relationship between the amount of land in

each land use category and the current population was determined to establish a starting point to determine what the land utilization picture might look like 10 years hence. These figures are shown in the following table and are based on an estimated current population of 48,166 (U.S Census, 1990).

Table 2 Current Acreage/Population Relationships by Land Use Type, St. Thomas

Land Use	Persons/Acre
Resort/Hotel	193
Retail/Commercial	193
Industrial/ Manufacturing	241
Residential (Low Density)	25
Residential (Medium Density)	18
Residential (High Density)	311
Agriculture	30
Parks and Recreation	161
Vacant	5
Resorts/Hotels	193

Sources: Island Resources Foundation, 1989.
U. S. Bureau of Census, 1990.

The existing land use pattern on St. Thomas indicates a larger allocation of commercial versus industrial land uses. This is related to the large degree of retail commercial activities serving the tourism industry. Residential development is characterized by the single largest allocation to medium density residential (eight dwelling units per acre on average), followed closely by low density (four dwelling units per acre on average). There is a relatively small allocation of high density residential.

HOTEL AND RESORT LAND USE

Hotel and resort development cannot accurately be projected based solely on land use/population basis. As previously discussed in the population projections and as seen in the following table, the number of hotel rooms/seasonal rental units has been projected for the planning period, based on the projected seasonal population expected by the year 2000.

Table 3 Projected Peak Daily Seasonal Population, St. Thomas: 1991 - 2000

Year	Peak Daily Seasonal Population
1990	8,231
1995	10,741
2000	13,006

Source: V.I. Department of Economic Development and Agriculture, Bureau of Economic Research
 V.I. Public Finance Authority Transportation Trust Fund Revenue Projections 1989-2000,
 The WEPA Group, 1989
 Financial Feasibility Study New Terminal Complex Cyril E. King Airport St. Thomas, USVI,
 Landrum and Brown, 1989

Based on that data the demand for hotel room/seasonal rental units (including condominiums and villas) on St. Thomas is expected to increase from 3,466 in 1990 to approximately 5,476 in the year 2000. This translates to a net increase of slightly more than 2,000 units between 1990 and 2000. The majority of this growth will most likely be accounted for by the hotels under construction, approved or proposed on the island. These include: Green Cay, Pemberton, Sugar Bay, WICO, Emerald Beach and other projects as shown on the following table.

Table 4 Hotel/Seasonal Unit Projects Approved or Application Pending, St. Thomas

<u>Hotel/Seasonal Condominium Projects</u>	<u>Number of Units</u>
Green Cay	560
Pemberton	150
Red Hook Villas	60
Sapphire Beach	150 (additional)
Sugar Bay	300
Condos Preferred	47
WICO Rupert Rock/Liverpool	400
Emerald Beach Hotel	192
Total	1,859

Source: V.I. Department of Planning and Natural Resources, 1990.

The number of hotel rooms/seasonal units already approved or proposed with application pending, amounts to over 90 percent of total expected demand for the next 10 years. This assumes, of course, that all permitted/proposed projects are actually built. The demand is based on a typical seasonal group or family containing, on average, about 2.4 persons.

COMMERCIAL LAND USE

To ascertain an approximate demand for the future commercial land

use activity, commercial development is projected based on the existing acreage per population ratio. Utilizing the existing ratio of one acre of retail/commercial land use per 193 people translates into a future demand of approximately 34 additional gross acres by the year 2000 on St. Thomas. This is based on a projected increase of 6,579 new residents between 1990 and 2000.

It should be noted that future commercial activity on the island is likely to experience a subtle shift toward more service-oriented uses rather than the traditional retail-oriented activities. Additional commercial activities will likely include higher land-consuming retail malls (e.g. Four Winds Regional Shopping Center), restaurants, offices and service activities.

The following table indicates some of the future activities, and shows the existing proposed/approved commercial projects on St. Thomas.

Table 5 Commercial Projects Approved or Application Pending, St. Thomas

<u>Proposed/Approved Commercial Development</u>	<u>Total Acreage</u>
Bovoni Warehouse (Retail)	0.6
Independent Boatyard (Offices, Stores, Restaurants, Marine services)	0.6
American Yacht Harbor (Restaurant, Gasoline station)	1.3
Four Winds Regional Shopping Center (Retail)	10.0
Kentucky Fried Chicken (Restaurant)	0.3
Al Cohen Mall (Bldg. 2- 3) (Retail)	1.2
Tramway/Flaghill (Retail, Restaurant)	1.0
WICO Long Bay (Retail, Offices)	3.5
Cable TV (Bldg.2,3) (Offices)	0.6
30/31 Norre Gade (Offices)	0.3
Demarara Commercial Center (Offices, Retail)	0.2
V.I. Plaza (Retail grocery)	1.0
Crown Bay (Retail, Offices)	2.0
TOTAL	22.6

Source:V.I. Department of Planning and Natural Resources. 1990.

This table shows that approximately 23 additional net acres of commercial space has already been approved or proposed for development. Applying a standard 25 percent net/gross conversion

factor (to account for parking, streets, landscaping, sidewalks, etc.) to the net acreage (DeChiara and Koppelman, 1975), indicates that approximately 28 of the total 34 acres projected for demand during the next ten years has already been planned. This amounts to 82 percent of total expected demand.

This ratio of commercial acreage to projected population assumes that the current relation of one acre to 193 residents is working reasonably well on St. Thomas today and will continue to do so in the future. It is difficult to predict with a high degree of accuracy as to what the future demand will be for retail commercial space and it is even harder to project these needs in a community where so much of the economy is based on tourism. The current ratio includes gift shops in Charlotte Amalie that cater primarily to the tourist, but does not include the hotels and resorts. All that can be done is to analyze the current retail situation and make a determination as to whether there is an adequate range of stores and shops to meet the needs of the people. This has been done as part of the Overall Economic Development Program for the Territory. This study has determined that there is a reasonable provision in the various retail components. Therefore, it may be assumed that this level of provision will continue for the foreseeable future.

There is more than enough land to accommodate the projected 34 acres of additional commercial land that is expected to be needed by the year 2000. Most of this additional land is expected to be developed in Intensity Districts 3,4, and 5, where the greatest numbers of people are expected to reside. As there are more than 9,000 acres of undeveloped land, there should be no problem in meeting this additional need.

Land that is needed for new retail facilities should be easily accessed from roadways and be within or adjacent to significant concentrations of housing. To the extent that it can be accomplished, creating a physical interrelationship between homes and shops where people can walk is to be encouraged. Certain retail functions, however, have a definite highway orientation and should be kept there. These include uses such as gasoline stations, auto repair facilities, building supplies, etc. Not only should they be relegated to highway areas, they should also not be allowed in the urban centers. If they were to be built in downtowns, this would be counterproductive to achieving a viable core area. Downtowns, to be successful, must allow for the freest possible movement of pedestrians. If a gasoline station were to be built up in downtown Charlotte Amalie, this would create a "hole" in a block that would force pedestrians to walk past an areas that is not intended for them to use. If this were to be allowed, and then to be repeated any number of times over, it would soon result in the death of the urban core area.

If the Comprehensive Land and Water Use Plan and the accompanying

Land Development Law are followed, there should be no conflicts provided that the performance standards are rigidly enforced. However, it will be necessary to pay special attention to any proposal to build any auto-related facility (e.g., gas station, automotive repairs, car dealership, etc.) or dry cleaning operation that is within close proximity to any groundwater recharge area. These types of activities can quickly contaminate groundwater resources and render them useless for years.

INDUSTRIAL LAND USE

The demand for Industrial/Manufacturing land use activities can be determined by examining the existing land use/population ratio. Based on an existing ratio of 1 acre/241 persons on St. Thomas, this would mean an additional demand for 27 acres of industrial/manufacturing land uses from 1990 to 2000. This is based on a projected increase of 6,579 residents.

It should be noted however, that much of the demand for industrial/manufacturing uses on St. Thomas will consist of warehouse and distribution space needs. There is currently a shortage of this type of space on the island. In fact, of the industrial type land activities either already approved or proposed, most of these are related to warehouse space (e.g. Bovoni Warehouse, Crown Bay). This had been determined through interviews with individuals associated with retail trade on the island and with the staff of the Department of Economic Development and Agriculture. These interviews were conducted as part of the Overall Economic Development Program that is being prepared for the Territory at the present time.

RESIDENTIAL LAND USE

Any exercise dealing with land demand analysis must first start with the projections of the population. It is expected that St. Thomas will grow to approximately 54,745 permanent residents by the year 2000. This represents an increase of 6,579 persons over the 1990 Census figure. Seasonal resident projections (and their related demand for seasonal dwelling units) are incorporated into the discussion of hotel and resort land use needs.

Residential development is generally the single largest user of land in a typical community, and St. Thomas is no exception to this rule. Of the approximately 8,600 acres of land that was in active use on the island in 1989 (the date of the last land use survey), about 4,750 acres were classified as residential. This amounted to about 55 percent of all of the land use in 1989.

The 1989 land use survey, performed by Island Resources Foundation (IRF), included no estimate of the number of dwelling units by intensity type (i.e., low, medium, or high density. Low density residential lands amounted to 1,955; medium density

accounted for 2,640 acres; and high density residential land estimated to occupy 155 acres. According to the 1990 Census, there are about 17,800 dwelling units on St. Thomas. At this point, the Census has not yet broken this number down into single family or multi-family units. Therefore, it has become necessary to make some assumptions as to the number of dwelling units that currently exist in each category. This has to be done to establish the parameters for the housing needs that are expected to occur over the next ten years.

The 1,955 acres classified as low density residential has been assumed to accommodate about four dwelling units per acre. This results in a figure of about 7,820 low density homes. For medium density residential development, an average density of eight dwelling units per acre has been assumed. This results in a yield of 10,560 homes. The 155 acres determined to be in high density housing has an assumed density of 12 units per acre. this results in a figure of 1,860 high density units. These low, medium, and high density allocations amount to 20,240 housing units. The remainder of the units (1,470) are assumed to be located in the Charlotte Amalie urban area. These units, for the purpose of establishing the current density breakdowns, are assumed to be high density units. The existing housing units for St. Thomas by density types, is estimated to be as indicated in the following table:

Table 6 Estimated Dwelling Units by Density Type, St. Thomas: 1990

Density	No. of Units	Percent Units
Low Density	7,820	39.0
Medium Density	10,560	52.0
High Density	1,860	9.0
TOTAL	20,240	100.00

Source: Island Resources Foundation, 1989.
U.S. Bureau of Census, 1990.

It is anticipated from now to the year 2000 that residents will be moving increasingly into more compact housing arrangements. The primary reason for this will be economic in nature. The cost of land and construction in the Territory have traditionally been higher than in the continental United States, and this relationship appears to be widening. The stated preferred living style among native Virgin Islanders is either their own single family home on their own lot, or more likely, a two-family structure that they own. Economic reality would seem to dictate that development will continue to increase in density in the future. This is evidenced by the growing demand for affordable housing in the Territory. The rapid escalation of housing prices

over the past decade has priced many Virgin Islanders out of the single-family housing market.

With this in mind, a projection has been made as to how the expected 6,579 new year-round residents of St. Thomas will be housed by the year 2000. It is also expected that the trend of a declining housing size that has existed for several years in the Territory will continue. In 1980, the average size on St. Thomas was 2.85 persons per unit; by 1990, this figure had decreased to 2.7 persons (U.S Census, 1990). For the purpose of this exercise, it is assumed this figure will continue to decline and be 2.4 persons per dwelling unit by the turn of the century. This means that more 5,000 units of housing will be necessary to accommodate the projected year 2000 population. The following table indicates the manner in which these units are expected to be required.

Table 7 Estimated Dwelling Units Demand by Density Type, St. Thomas: 1991 - 2000

Density	No. of Units	Percent Units
Low Density	501	10.0
Medium Density	3,257	65.0
High Density	1,253	25.0
TOTAL	5,011	100.0

Source: Island Resource Foundation, 1989.
U.S. Bureau of Census, 1990.

Having established this estimated breakdown of housing unit types that will have to be built over the next ten years, and assigning to these units the current land requirement that exist on St. Thomas, a projection can be made of the amount of land that will be needed to accommodate these homes. These acreages are presented in the following table.

Table 8 Estimated Residential Needs by Density Type, St. Thomas: 1991 - 2000

Density	No. of Units	Average Density	Acreage Requirements
Low Density	501	2 D.U./Acre	250.5
Medium Density	3,257	4 D.U./Acre	814.3
High Density	1,253	12 D.U./Acre	104.4
TOTAL	5,011	-----	1,169.2

Source: Island Resources Foundation, 1989.
U.S. Bureau of Census, 1990.

The average densities used in the proceeding table reflect the current density pattern that exists on St. Thomas. It is assumed that while there is expected to be a shift away from lower density residential development, the relative intensity pattern within the density designations will remain approximately the same.

Based on the overall trend in population gain between 1980 and 1990 by planning district, relative shifts in population growth become evident. By analyzing the difference between 1980 and 1990 Census counts, areas of high growth can be differentiated between those areas increasing at a lower rate and the projected population for the year 2000 can be allocated geographically on the island. These figures are presented below.

Table 9 Planning District Population Growth, St. Thomas: 1980-1990 and Projected Population for 2000

<u>Population Planning District</u>	<u>1980</u>	<u>1990</u>	<u>Projected Population 2000</u>
East End	4,722	5,927	7,736
Tutu	8,939	9,084	9,574
Northside	5,730	6,404	7,496
Westend	1,075	1,322	1,695
Charlotte Amalie	19,304	20,589	22,935
Southside	4,450	4,668	5,105
Water/Hassel Island	152	172	204
Total	44,372	48,166	54,745

Source: U.S. Census of Housing and Population, 1980 and 1990.

The data indicate the largest increase in population was in Charlotte Amalie, although the East End experienced a more dramatic increase in population, with 25 percent growth in population over the decade. These trends are expected to continue for the next ten years.

Public Participation and the Planning Process

The Comprehensive Land and Water Use Plan development process included citizen input and participation as an integral part. The first series of public hearings included a discussion that allowed the participants to express what they expected from the Plan as well as prioritize their areas of concerns.

The citizen notice effort included contacting community organizations and churches, the placement of posters around the island, radio and television interviews, editorials in local newspapers, and public service announcements on the radio.

Approximately 150 attendees signed in at the six outreach meetings on St. Thomas. The first meeting, held at the Charlotte Amalie High School Cafeteria on March 26, 1990, represented the mid-island region encompassing the following communities: Altona, Altona-Westgunst, Honduras, Demarara, Annas Fancy, Kronprindsens Quarter, Staabi, Agens Fancy, Queen Quarter, Littens Fancy, King Quarter, Hospital Ground, Ross, Thomas, and Solberg.

On March 27, 1990, two separate meetings were held; the first, for West End residents, was held at the University of Virgin Islands; and the second, for the Northeast Region of St. Thomas, was held at the Tutu Reformation Church. The West End includes the following communities: Botany Bay, Bordeaux, Bethesda, Fortuna, Hope, Perseverance, Bonne Esperance, Santa Maria, Crown and Hawk, Adelphi, and John Brewers Bay. The Northeast Region is comprised of the following communities: Smith Bay, Anna's Retreat, Coki Point, Frydendal, Tabor and Harmony, Mandahl, Wintberg, Lovenlund, Peterborg, Magens Bay, Canaan and Sherpen Jewel, Herleins Kob, Louisenhoj, St. Josephs, and Rosendahl.

On March 29, 1990, two more meetings were conducted. One was held at the Bovoni Baptist School to meet with the Southeast Region of St. Thomas; the other at the Frenchtown Community Center for the Southwest Region. The Southeast Region includes the following communities: Bakkerø, Frenchmans Bay, and Nazareth. The Southwest Region encompasses the following communities: Lindbergh Bay, Contant, Nisky, Lilliendal, Marienhoj, Upper John Dunko, Lower John Dunko, and Solberg.

The last meeting for St. Thomas was held on April 1, 1990, for the Northside Region. The meeting was held at the Mafolie Clubhouse and represented the following communities: Zufriedenheit, Mafolie, Misgunst, Elizabeth, Lerkenlund, St. Peter, Hull, Bonne Resolution, Dorothea, Neltjeberg, Caret Bay, Sorgenfri, and Pearl.

A review of the public outreach Town Meetings that were held around the island (which were well attended) indicates the degree to which the island's residents that attended consider the issues listed to be problems. They are shown graphically in the following table.

Table 10 Relative Impact of Planning Process, St. Thomas

Category	Degree of Significance
Affordable Housing	•
Traffic, Roads	•
Health Facilities, EMS	•
Fire, Police	•
Schools	_
Parks, Recreation	○
Public Sewage	○
Potable Water	○
Drainage, Flood Control	○
Water Pollution	○
Solid Waste	○

Legend		
• Highly Significant	_ Significant	○ Less Significant

Source: Tabulation Survey, Strategic Planning Group, Inc., 1990

As can be seen, many of the most significant issues of concern relate to the delivery of public services, such as adequate transportation facilities, fire, emergency medical and police services, and schools. Of highest significance, however, was the desire for more affordable housing opportunities. The public expressed a desire for a return to the quality of life they felt existed in the island's past when there was more green space, accessible beaches, clean water, and a sense of community.

Based on the initial community input at the public outreach Town Meetings, a series of alternative concept plans were prepared and presented to the public on St. Thomas. The citizens' concerns aired at the first set of public meetings provided much of the input for these plans. The alternative concepts prepared were the Town Center and the Urban Overspill approaches. The intent in all alternatives presented for consideration was to guide future development into those areas best suited for it, allowing for a certain amount of flexibility to respond to natural, economic and market forces.

Beside the proposed alternatives, other concepts were reviewed, including a Do Nothing and a Maximum Preservation Approach. They were not deemed appropriate for further consideration for a variety of reasons. The do-nothing concept would allow new housing, commercial, resort, and industrial development to occur under the present zoning. The government would do nothing to change the proposed land use pattern in force today, and would simply develop a land use plan that conforms to the existing zoning map. This plan was dropped for several reasons. First, the Zoning Code is nearly 20 years old and is considered to be out-of-date. Second, the Territory is comprised of three main islands with obvious land resource limitations, and the present Code does not adequately address how these resources should be preserved. Third, conflicts between the Coastal Zone Management Regulations and the Zoning Code would not be resolved. Finally, there is widespread dissatisfaction with the manner in which the present Code is inflexible in accommodating diverse land uses. This is evidenced by the large number of rezoning requests that are applied for continually.

The maximum preservation alternative might also be termed a no-growth strategy. This would basically restrict growth to those areas that are either developed, undergoing new development, or already have development approval. This strategy could accommodate the growth that is expected to occur by the year 2000, but not much more. That is the limitation of this concept. Additionally, this type of strategy would tend to stifle development. This is not the intention of the new Plan. Rather, new growth handled in a responsible manner is to be encouraged. Not only should the projected growth for the next 10 years be accommodated by any plan, a framework must be provided for growth management into the 21st century.

URBAN OVERSPILL ALTERNATIVE

This alternative called for a continuation of the trend of residences moving away from the urban centers, spreading into more rural areas. This trend has existed on St. Thomas for the past 25 years and was caused by:

- Construction of public housing;
- Government subsidized residential development; and
- Greater mobility due to the automobile.

Although this plan reflected a commitment to the current trends, it included some important changes so that the outward growth can be managed effectively. This alternative acknowledged geographic situations unique to the island, such as floodplains and steep slopes; and provided for the preservation of green and open

spaces. This type of preservation policy would have the additional benefit of helping to define the more urban areas, and would tend to break up any continuous sprawl pattern.

In this alternative, Charlotte Amalie would continue to be the primary urban center on the island, with some expansion of its urban core. Within this area would be an expansion for the normal mix uses typically found in urban centers. These include high-intensity development, including housing and commercial facilities for both tourists and permanent residents, and government and private office uses.

This alternative assumed single- and two-family homes and individual lots would house the majority of the expanded population. The cost to the government to service this type of development would be much greater than with the Town Centers approach. Since both of the alternatives have taken as a given the same projected population, one would assume the number of additional schools, fire and police facilities, sewage treatment plant expansions, health care facilities, and parks and recreation areas would be the same for both scenarios. This is not necessarily the case. As one disperses population, there is a greater need for the public facilities to be built in close proximity to that development, due to response time for fire and police protection, for example. Furthermore, facilities are usually not utilized in an optimum fashion when population /demand is spread out (in other words, should these facilities be built, some may be underutilized). Lastly, but perhaps most importantly, as population spreads, so does the number of automobile trips per household, thereby increasing traffic congestion island-wide.

This alternative maximized the use of existing infrastructure, related well to existing roadways, and offered a wide range of housing opportunities. However, it required a higher capital investment for improvements, provided greater potential for land use conflicts, and offered fewer development options for postyear 2000 development.

TOWN CENTER ALTERNATIVE

This alternative called for the return to a more traditional land development pattern for a Caribbean island. Such an approach emphasizes a small urban settlement pattern with a strong neighborhood focus as an appropriate development concept.

The Town Center alternative would be the most efficient in terms of using existing infrastructure (water, sewer, roads) to accommodate future development. Allocating more land for higher intensity urban activities and locating these areas where the roadways and other services already exist will be the cost-effective. Additionally, a strong neighborhood focus, or sense

of place, would be reinforced and residents would be able to identify with their own particular geographic area.

Through a second series of public outreach meetings, a community-based consensus for the final plan was reached which focused on the Town Centers concept. From that point, the preferred Town Centers Plan was further refined through months of scrutiny and review by the St. Thomas Citizens Advisory Committee; DPNR planners (to insure consistency with existing and approved, but as yet unbuilt projects); other governmental agencies (to insure consistency with their plans and major capital improvements projects) and private sector trade representatives such as the Board of Realtors.

Assumptions

In the development of the concept plans for St. Thomas, the following assumptions were made.

- The proposed Government Office Complex at the intersection of Weymouth Rhymer Highway and Donoe Road is expected to be completed within the next 10 years.
- A population level of between 55,000 to 65,000 (permanent and seasonal) will have to be accommodated by the year 2000.
- Government does not have the ability to expand infrastructure island-wide within this planning period.

Preferred Concept: Town Center

This planning concept calls for the return to a development pattern which is more traditional. Such an approach emphasizes a more compact settlement pattern with higher intensity core areas which service surrounding lower intensity residential development and a strong neighborhood focus.

The efficiency and highest level of positive impact of this concept requires that the most intensive development be located in areas already serviced by roads, water, and sewer, or where these facilities can easily be extended. It will also be necessary to more severely restrict urban development outside of the growth centers. This is not to say that development would be prohibited outside of the proposed town centers; rather, it is suggested that government initiatives, programs, resources, and energies be directed in support of this concept by upgrading and expanding the infrastructure in and around Tutu, Red Hook, Bovoni, and Nadir as well as Charlotte Amalie. At the same time, other policy and regulatory measures would be taken to discourage development in floodplains, steeply sloped lands, and other

environmentally sensitive areas. These include discouraging the expansion of water, sewer, or roadway development in certain areas. The proposed development of a new Government Office Complex on Weymouth-Rhymer Highway will promote development in this area. It will also help relieve traffic pressures in Charlotte Amalie where many government offices are now located.

Charlotte Amalie

Charlotte Amalie would continue to be the primary urban center on the island. Urban growth and development is envisioned to expand under this scenario eastward toward Donoe, as well as into the Contant and Lindbergh Bay areas to the west. The growth that occurs in Charlotte Amalie should take the form of increased amounts of mixed use development. Mixed use, within an urban context, refers to one building having a number of different, but compatible, activities under one roof (for example, shops on the first floor and housing located above it).

Having housing over commercial or office space was common in the Virgin Islands in years past and could be done in many existing buildings in Charlotte Amalie today. This situation occurred in a time when downtown serviced residents; such is now not the case. If it were to become a reality, the life in the downtown areas would extend beyond the current 9:00 a.m. to 5:00 p.m. time frame. More shops could remain open for longer periods because the residential activity within the area would create a demand even after the private and government offices close. Additionally, there would probably be less need for private automobiles (not more than one per household) if more people could live, work, and shop in this rather tightly defined geographic area. This decreased demand for cars (and/or number of travel trips) would obviously result in not having to provide as many parking spaces, either on the street or in parking lots. And, to the extent that cars can be removed from the urban scene, the fewer disruptions there would be in the rows of stores, shops, and offices in Charlotte Amalie. This should result in real economic benefits because people shop, cars do not.

Within the context of any expansion or redevelopment of Charlotte Amalie, care must be taken to preserve the integrity of the historic structures. This community contains many buildings that date to the island's colonial past. Some have been carefully restored to their original state, and others have been changed from their original use with sensitivity so that the architectural integrity has been maintained.

Tutu/Red Hook

Intensive land use activities will be concentrated within the Tutu and Red Hook areas to avoid the negative impacts of sprawl.

It will be more difficult to establish an urban identity in these areas because so many of the activities have definite automobile orientation and, therefore, are spread out. In-filling of vacant lots with higher density housing development will have the effect of supporting the commercial development that exists and possibly reduce dependence on the private car. This scenario proposes that this sort of strategy be employed in the development of this area.

Bordeaux

The general area around Bordeaux is being proposed to evolve as an emerging secondary growth center. Currently, neighborhood has some residential subdivisions, as well as the beginnings of a fire station that was started several years ago. Much of the land is vacant, however, and this concept would allow for development of private and public neighborhood facilities along the roadways. Located in the outlying areas should be low-intensity development, such as the new Fortuna housing development being built by the Housing Finance Authority.

Krum and Crown Bays

Between Charlotte Amalie and the Cyril E. King Airport, in the area of Krum and Crown Bays, is the land proposed for continued industrial and warehousing development. It is recommended that industrial, warehousing and distribution facilities be concentrated in this area. It will be counter-productive to allow additional lumber yards, warehouses or small fabrication operations that have been constructed along some of St. Thomas' main routes to develop outside of this area any longer.

The Town Centers concept would be most efficient in terms of using existing infrastructure (water, sewer, and roads) to accommodate future development. The areas that are most intensively developed now are, in the main, those sectors that have these facilities now. It would cost less to accommodate new development in these areas than to install new water and sewer lines in remote locations. Allocating more land for higher intensity urban activities and locating these areas where the roadways and other services already exist will be most cost-effective. Additionally, a strong neighborhood focus, or sense of place, would be reinforced on the island and residents would continue to identify with their own particular geographic area.

Application of the Concept to St. Thomas

Under the recommended plan, Charlotte Amalie (Intensity District 5) would maintain and expand its role as the major town on St. Thomas. Intensity District 5 areas encompass the Fort Christian/Legislature Building areas and Bluebeard's Hill westward to include downtown, Bunker Hill, Berg Hill, and

Frenchman Hill to the Frenchtown area.

Additionally, two new growth centers are proposed: the Anna's Retreat mid-island area in the heart of Tutu and the Red Hook area along the north side of Vessup Bay. In addition, emerging growth areas are planned for Bordeaux and Nazareth and Bovoni.

Along both eastern and western boundaries of Charlotte Amalie are areas designated as Intensity District #4 that extend eastward to Long Bay and Sugar Estate Road, allowing for more intensive mixed-use development in those sectors. West of downtown, along both sides of Veterans Drive, a rather large area of Intensity District #4 is proposed encompassing Anna's Fancy, Frenchtown, Altona, and certain areas in Contant, allowing for the in-filling of vacant lots in this area with relatively intensive land uses.

The Four Winds/Tutu Park commercial area has been identified as a growth center, and is designated Intensity District 4. This would allow moderate- to high-intensity housing to be developed, as well as community commercial facilities and mixed use developments. Surrounding this area, Intensity District 3 sectors are proposed for most of Tutu that would allow for moderate-intensity residential development to be built, along with supporting activities that could include neighborhood stores, recreation areas, clinics, churches, and schools. This is a reflection of the character of the general existing development pattern in these areas. This designation also reflects the existing and planned improvements to the sanitary sewer and potable water systems planned for the area, which will be necessary to serve more intensive development activities. Another Intensity District 4 designation has been applied to the Donoe By-Pass and Weymouth-Rhymer Highway area where the proposed Government Office Complex will be located. This designation reflects the capacity to develop commercial and higher density housing as supporting elements to this proposed major employment center. Future development of this area, however, must be dependent upon the extension of sewer and water lines.

The Red Hook area is proposed as another growth center (Intensity District 4). This reflects the intensifying commercial and residential development and marina related activity in the area.

Areas of supporting Moderate Intensity development (Intensity District 3) are proposed for portions of Nazareth and Frydenhoj which have good highway access and are located close to existing schools and commercial activities in the Red Hook area. This is also consistent with and dependent on the extension of potable water and sanitary sewer facilities along East End Road. Much of the existing development in this area is presently served by the Vessup Bay wastewater treatment plant. However, this facility often fails to adequately treat the wastewater effluent and discharges poorly treated or untreated effluent directly into Vessup Bay. This has directly led to the degradation of water

quality. Therefore, the Department of Public Works has planned to ultimately change this facility into a pump station to transfer effluent to the proposed Mangrove Lagoon treatment plant on Long Point, prior to treatment and discharge into Stalley Bay. This will not only help to improve water quality in Vessup Bay, but will also provide additional capacity for future development in the East End.

Additional wastewater (upon completion of the Mangrove Lagoon WWTP) and potable water service are scheduled to be delivered into Bovoni and Nadir areas during the next ten years. These areas are proposed for moderate intensity development (Intensity District 3), which would allow for moderate to higher intensity housing to be built in this area.

Bordeaux is proposed as an emerging secondary growth center. An Intensity District 3 node has been established adjacent to the existing residential land uses. It is envisioned that neighborhood shopping, schools, clinics, and housing would evolve in this area. Immediately east and south of this node is an Intensity District 2 area which could also accommodate housing, as well as schools, churches, and recreational facilities. The development of this area in this manner would support the concept of establishing an emerging growth center, allowing an area of neighborhood shopping, housing, schools, clinics, churches, parks, and play areas to evolve here.

Implementing this higher intensity development in the Bordeaux area will require expansion of infrastructure, including the construction of new roads and sewer lines. It is not expected that this can be entirely accomplished within the next 10 years, given the backlog of existing demands and commitments on the territorial budget. Therefore, careful consideration should be given to programming adequate capital improvements to the area. The HFA housing developments planned for the area will bring a demand for additional services to the West End. However, future developments should be predicated on the availability of those public facilities and services necessary to support more intensive uses.

The Northside of the island is planned mostly as an Intensity District 2, low intensity. This reflects the existing character of the area -- scattered lower density residential development and the lack of public facilities and services either existing or planned in the area. In addition, the steep topography and winding roads in the area will make more intensive development very difficult to manage.

Smaller areas of higher intensity uses, such as resorts, are designated as Intensity District 4 to reflect the relatively higher impact these facilities generate relative to increased traffic and use of sewer service areas. Most of these facilities

operate their own "package" wastewater treatment systems and reverse osmosis potable water treatment systems. These are mostly located in the Smith Bay area (e.g., Stouffer Grand and Sugar Bay), East End (e.g., Sapphire Beach, Elysian, Pemberton) and Southside (e.g., Bolongo Bay, Green Cay, Limetree, Frenchmans' Reef).

Low intensity areas (Intensity District 2) are generally proposed where physical land constraints (such as steep slopes or floodplains) combine with existing low density residential uses or where previously subdivided, but as yet mostly undeveloped land occurs. These areas are also associated with the lack of public water and sewer service, and more difficult road access usually due to topography. Examples include portions of Frenchmans' Bay, Lovenlund, and Mandahl.

Industrial uses (Intensity District 6) are encouraged to locate in the Krum Bay/Crown Bay area while another area is similarly designated near Bovoni and Long Point to recognize the demand for more intensive public facilities in the East End, including the existing landfill, proposed Mangrove Lagoon WWTP, and the proposed desalination facilities.

ST. JOHN LAND AND WATER USE PLAN

Existing Land Use Patterns

Prior to the 1940s, St. John's population was concentrated in Coral Bay and Cruz Bay. At that time, Coral Bay had the higher concentration of the island's residents. The development pattern reflected the people's way of living. Neighborhoods functioned as communities with strong social cohesion, with extended families living in close proximity. Grocery stores, boat yards, bakeries, rum shops and restaurants were usually located within residential neighborhoods, reinforcing a strong sense of place and identity.

This pattern of land development originated in Cruz Bay and Coral Bay, where land was limited and commercial activities served the people's basic needs. Since transportation was limited primarily to donkey carts, rural settlements often imitated the town areas.

In the early 1950s, Laurence Rockefeller embarked on a mission to preserve the unique natural environment on St. John by purchasing large tracts of land throughout the island and donating them to the National Park Service. Historic and natural resources were preserved for posterity. The elimination of this large portion of St. John from the inventory of land available for development, combined with the rapid growth of tourist-related facilities on St. Thomas, served to shift the population to Cruz Bay.

In addition to the population shift in the late 1950s and 1960s, other factors influenced growth patterns. For instance, the Cuban revolution had a profound effect. After 1959, the Virgin Islands became a popular vacation destination in the Caribbean because of its political status, and Governor Paiewonsky's policies promoting the islands as vacation spots.

As residents began to earn higher wages, the demand for single-family homes increased along with the population. New residential development attracted residents from traditional neighborhoods in Cruz Bay to Fish Bay, Gift Hill, Chocolate Hole, Contant, Great Cruz Bay, Enighed, and Pastory.

The extensive landholdings of the Virgin Islands National Park and the subsequent lack of easily developable private real estate are factors controlling the future development of land on St. John. Some significant areas of private landholdings remain within the authorized Park boundaries and a few of them have development potential. However, future growth in this area must respect the integrity of surrounding park lands.

Historically, land use patterns in Cruz Bay incorporated mixed uses at high densities. People had easy access to public

services, such as police and fire protection. Recent growth outward from Cruz Bay has resulted in the government's inability to efficiently provide adequate infrastructure.

St. John is dominated by the presence of the Virgin Islands National Park, which occupies about two-thirds of the island. Blanketing the central area, the Park splits the island's privately held lands in the western sector focusing on Cruz Bay, and the east end, which has scattered residential development around Coral Bay.

Within the National Park's authorized boundary are several in-holdings, most of which have either very limited or no development. However, some do have significant land use activities. These include the Caneel Bay resort and Maho Bay campground area, which provide accommodations for tourists. There are also some small subdivisions within the Park. Several historic sites are found throughout the Park, including significant remains of old sugar mills and plantation homes. Probably the most noteworthy historic site on St. John is the Annaberg Plantation.

Outside of the National Park, the most significant activity center is found at Cruz Bay. There are dockage facilities here for the ferries that run hourly between St. John and St. Thomas. Most of these boats carry residents going to work or school on St. Thomas and tourists visiting the island from St. Thomas. Additional space is available at the Creek to accommodate freight forwarding activities. There are a large number of pleasure craft moored and anchored in Cruz Bay. There are also many residents of St. Thomas who arrive every day to work in some of the larger hotels and resorts on St. John. Tourists who may be staying on St. Thomas will spend a day on St. John, renting a vehicle to drive around the National Park. All of this activity has had an impact on the land. The two main retail centers, Mongoose Junction and Wharfside Village, are within walking distance of the docks and have shops and restaurants catering to the tourists. Other commercial facilities can also be found in Cruz Bay, including gift shops, convenience stores, and a gas station. Cruz Bay is also the seat of government on St. John, with various branch offices of different agencies located there. An increase in boat traffic carrying greater numbers of tourists and residents has created severe traffic problems in Cruz Bay. It will be important to solve the problem while attempting to accommodate additional growth at the island's main urban center.

What must be guarded against on St. John is any movement that would cause the population to spread itself out either on the east or west side of the island. The Port Authority's development plans for Enighed Pond, which call for a relocation of the freight handling operations from the Creek area, could lead to a demand for more commercial development outside of Cruz Bay. Although the

current resident and seasonal population of the island is small and projected to be far less than that of St. Thomas or St. Croix, the pressures for more fast food restaurants and roadside gift shops could be great. This is because of the increasing numbers of excursionists that come over to St. John to visit the National Park.

Such pressures could quickly lead to new housing development spreading out on both sides of the island and, in turn, make more people increasingly dependent on the automobile. Public input from residents during the series of Town Meetings noted the increasing traffic and parking problems in Cruz Bay. To the extent that future development can be reasonably compact (thereby reducing the need for an inordinate number of new cars), then the traffic and parking situation can be dealt with.

Another significant problem that must be addressed is continued development of steep slopes. St. John is extremely mountainous. While the islands population will continue to grow, the questions of how to accommodate this growth on land that is available for development may be the most important one to answer. If the answer is the wrong one, island residents will experience floods and washouts because of increased erosion. If it is correct, the integrity of the guts will be maintained. This will reduce the probability of upland erosion that can result in off-shore siltation problems.

On St. John's west side, most of the flood prone lands are associated with tidal surges from major tropical storms. The east side of the island also has lands with similar characteristics. The Coral Bay area, where the flattest land exists, is also subject to flooding from water that runs off the surrounding hills into this natural basin. This area would otherwise be most suited to the development of a secondary center. It should be noted that the elementary school, church, and other development in this area are within the bounds of the floodplain.

This overview of the existing land use pattern is the starting point in the planning process to determine how St. John residents want growth to be managed for the next 10 years.

Land Demand Analysis

Based on the projected population growth between 1990 and 2000, an analysis of future demand can be made for residential hotel and resorts, commercial and industrial land uses.

Table 11 Resident Population Projections, St. John: 1991 - 2000

Year	Population	Additional Growth
1970*	1,921	
1980	2,472	
1990	3,504	107
1991	3,611	110
1992	3,721	114
1993	3,835	117
1994	3,952	121
1995	4,072	124
1996	4,196	128
1997	4,324	132
1998	4,456	136
1999	4,592	140
2000	4,732	144

Sources: Department of Commerce, Bureau of the Census

Note: 1991 - 2000 estimates were computed using 1970 (adjusted) - 1990 growth rate.

*There are concerns that the 1970 Census population data for St. John was inaccurate.

SPG used adjusted 1970 population figures commonly accepted in the Territory.

The first step performed in this exercise was to determine how much land is currently being used in the various land use categories. Calculations were made from the existing land use map prepared by Island Resources Foundation in 1989. These data revealed that approximately 9,100 of the 12,295 acres that make up the island of St. John, or almost three-quarters of the land area, is currently being utilized or occupied with some use (including the National park). Of this, approximately 8,450 acres, or almost 93 percent, of the land that has been developed is designated as being in an open space/recreational classification (obviously related to the existence of the Park).

About 390 acres are in residential use. Retail commercial uses occupy approximately 27 acres. Industrial uses amount to approximately 7 acres. Resorts and hotels occupy about 170 acres of land, while the public facilities and institutions on the island (schools, clinics, etc.) currently claim only 25 acres. There are approximately 3,190 acres of vacant or undeveloped land on St. John.

As shown in the following table, the relationship between the amount of land in each land use category and the current population is a starting point to determine what a land utilization picture might look like 10 years hence. These figures are shown in the following table and are based on an estimated current population of 3,504, including year-round and

seasonal residents.

Table 12 Current Acreage/Population Relationships by Land Use Type, St. John

Land Use	Persons/Acre
Retail/Commercial	130
Industrial/Manufacturing	501
Residential (Low-Density)	13
Residential (Medium-Density)	27
Parks and Recreation	0.4
Agricultural	116
Vacant	1

Sources: Island Resources Foundation, 1989.
U.S. Bureau of the Census, 1990.

The existing land use pattern indicates somewhat more demand for commercial space per capita than St. Thomas. The allocation for industrial space is extremely small. Both existing commercial and industrial land uses are presently located in the immediate Cruz Bay area. The allocation of residential land use is comprised of low density (2 dwelling units per acre on average) and medium density residential (4 dwelling units per acre, on average). No high density residential was identified on St. John according to the Island Resource Foundation survey.

Hotel and Resort Land Use

Hotel and resort development cannot be projected based solely on a land use/population basis. As previously discussed in the population projections, the number of hotel rooms/seasonal rental units has been projected for the planning period based on the projected seasonal population expected by the year 2000.

Table 13 Projected Peak Daily Seasonal Population, St. John: 1991 - 2000

Year	Peak Daily Seasonal Population
1990	1,900
1995	2,479
2000	3,002

Source: V.I. Department of Economic Development and Agriculture, Bureau of Economic Research
V.I. Public Finance Authority Transportation Trust Fund Revenue Projections 1989-2000,
The WEPA Group, 1989
Financial Feasibility Study New Terminal Complex Cyril E. King Airport St. Thomas, USVI,
Landrum and Brown, 1989

According to this data, the demand for hotel room/seasonal units (including condominiums and villas) on St. John is expected to increase from 800 in 1990 to 1,264 by the year 2000. This translates to a net increase of 464 units over the next 10 years. Approximately half of this expected new growth in hotel/seasonal units is already being planned, as witnessed by the development proposals shown in the following table.

Table 14 Hotel/Seasonal Unit Projects Approved or Application Pending, St. John

<u>Anticipated Projects</u>	<u>Number of Units</u>
Concordia Campgrounds	120
Caneel Bay (Scott Beach)	40 (additional)
Pond Bay Club	70
Total	230

Source: V.I. Department of Planning and Natural Resources, 1990

COMMERCIAL LAND USE

To determine an approximate demand for future commercial land use activity, commercial development is projected based on the existing acreage per population ratio. Utilizing this ratio of 1 acre of retailing/commercial use for every 132 persons translates into a future demand of approximately nine additional acres by the year 2000 on St. John. This is based on a projected increase of 1,228 residents during the same time period. Most of this retail activity will be focused in the Cruz Bay area with possibly some limited convenience commercial development taking place in the Coral Bay area.

INDUSTRIAL LAND USE

Currently, industrial development is extremely limited on St. John, with only about seven acres in this category. This one acre of industrial land per 480 population translates to an additional demand of three industrial acres by the year 2000. This industrial development (expected to consist of primarily warehousing) is proposed to occur in the Enighed Pond area of Cruz Bay. Plans by the Virgin Islands Port Authority call for the development of the Pond area as an industrial marine off-loading and repair facility. Industrial activities are anticipated to be warehousing, small ship repair, fuel storage, and storage for bulk materials and containers necessary for transporting goods and materials to the island.

RESIDENTIAL LAND USE

St. John is expected to grow to 4,732 permanent residents by the year 2000. This represents an increase of 1,228 persons over the

1990 Census figure.

Residential development is generally the single largest user of land in a typical community and, if the National Park lands are excluded, St. John complies with this rule. Of the approximately 650 acres of land in active, urban use on the island in 1989, about 390 acres, or 60 percent, of this land was classified as residential.

The 1989 land use survey included no estimate of the number of dwelling units by intensity type (i.e., low, medium, or high density). It did, however, calculate the number of acres in the low and medium density classifications. They found no housing on St. John that, according to its definition, fit the high density criteria. Low density residential land amounted to about 260 acres, while medium density residential accounted for another 130 acres. According to the 1990 Census, there are 1,900 dwelling units on St. John. At this time, the Census has not yet broken this number down into single family or multi-family units. Therefore, it has become necessary to make some assumptions about the number of dwelling units that exist in the low and medium density categories. This has been done to establish the parameters for the housing needs that are expected to occur over the next decade.

The 260 acres classified as low density residential have been assumed to accommodate, on average, approximately 2.5 dwelling units per acre. This results in a figure of about 665 dwellings in the low density category. For medium density housing, an average of 9.5 units per acre has been assumed, which computes to approximately 1,235 homes. The existing housing units for St. John, by density type, is estimated to be as indicated in the following table:

Table 15 Estimated Dwelling Units by Density Type, St. John: 1990

Density	No. of Units	Percent of Total
Low Density	665	35.0
Medium Density	1,235	65.0
Total	1,900	100.0

Sources: U.S. Bureau of the Census, 1990.
Island Resources Foundation, 1989.

It is anticipated from now to the year 2000 that residents will be moving increasingly into more compact housing arrangements. The primary reason for this will be economic in nature. The cost of land and construction in the Territory has traditionally been higher than in the continental United States, and this relationship appears to be widening. The stated preferred living

style among native Virgin Islanders is either their own single family home on their own lot or a two-family structure that they own. Economic reality would seem to dictate, however, that this will become less and less attainable in the future as the cost of housing continues to increase at a rapid pace, beyond the means of many Virgin Islanders to afford.

With this in mind, a projection has been made regarding how the expected 1,228 new year-round residents of St. John will be housed by the year 2000. It is also expected that the trend of declining household size that has existed for several years in the Territory will continue. In 1990, the average household size on St. John was 1.83 persons per unit; by the turn of the century, it is assumed this figure will decline to approximately 1.7 persons per household. This means that 872 new units of housing will be needed to accommodate the projected year 2000 population. It is further assumed that there will be the beginnings of a high density residential component developing in the next ten years. The following table indicates the assumed housing breakdown of the new units for the year 2000.

Table 16 Estimated Dwelling Units by Density Type, St. John: 1991-2000

Density	No. of Units	Percent of Total
Low Density	218	25.0
Medium Density	567	65.0
High Density	87	10.0
Total	872	100.0

Source: Island Resource Foundation
U.S. Bureau of Census, 1990.

Having established this estimated breakdown of housing unit types that will have to be built over the next ten years, and assigning to these units the current land requirements by category that exist on St. John, a projection can be made of the amount of land that will be needed to accommodate these homes. This acreage is presented in the following table.

Table 17 Estimated Residential Needs by Density Type, St. John: 1991-2000

Density	No. of Units	Average Density	Acreage Requirements
Low Density	218	2.5 D.U./Acre	87.2
Medium Density	567	9.5 D.U./Acre	59.7
High Density	87	12.0 D.U./Acre	7.3
Total	872		154.2

Source: Island Resources Foundation, 1989.

The average densities indicated in the preceding table for low and medium density housing are a reflection of the current intensity of development in these respective categories. While a shift from a sprawling tendency is being proposed by encouraging more growth in higher density areas, the intensity of development within the low and moderate designations is expected to remain about the same. The high density classification's average density is a reflection of what is proposed for this category in the Land Development Law.

St. John's population increased by more than 1,000 persons between 1980 and 1990. This represents an increase of 41.7 percent for the decade. On the island itself, the major growth was experienced around the Cruz Bay area, as shown on the following figure.

Table 18 Planning District Population Growth, St. John: 1980-1990 and Projected Population for 2000

Planning District	Population		Projected 2000
	1980	1990	
Central	246	621	1,186
Coral Bay	256	363	482
Cruz Bay	1,928	2,469	3,006
East End	42	51	59
Total	2,472	3,504	4,732

Source: U.S. Census of Population and Housing, 1980, 1990

Public Participation and The Planning Process

Many St. John residents feel that the island's growth can be attributed, in part, to the reduced population growth rate on St. Thomas. In other words, many of the negative impacts of growth on St. Thomas have not yet been felt as significantly on St. John. In addition, the socioeconomic makeup of the island differs from that of St. Thomas. St. John has fewer economic opportunities due to its smaller size and the presence of the National Park. It is populated generally by an older resident population many of whom are retired and seek a quieter life than that found on bustling St. Thomas.

Town Meetings held on St. John elicited many concerns from the public. The development of affordable housing opportunities, improving schools, and transportation facilities were among the most important concerns voiced. The following chart depicts the degree of significance of the issues noted by the attending public.

Table 19 Relative Impact of Planning Process, St. John

Category	Degree of Significance
Affordable Housing	•
Schools	•
Traffic, Roads	•
Health Facilities, EMS	•
Solid Waste	•
Fire, Police	—
Parks, Recreation	○
Public Sewage	○
Potable Water	○
Draingae, Flood Control	○
Water Pollution	○

Legend		
• Highly Significant	— Significant	○ Less Significant

Source: Tabulation of Survey, Strategic Planning Group, Inc., 1990.

Based on the initial community input at the Town Meetings, a series of concept plans were presented to the public on St. John. The alternative concepts prepared were the Town Center and the Urban Overspill approaches. The intent in all alternatives presented for consideration was to guide future development into those areas best suited for it, allowing for a certain amount of flexibility to respond to natural, economic and market forces.

Beside the proposed alternatives, other concepts were reviewed, including a Do Nothing and a Maximum Preservation Approach. They were not deemed appropriate for further consideration for a variety of reasons. The do-nothing concept would allow new housing, commercial, resort, and industrial development to occur under the present zoning. The government would "do-nothing" to change the proposed land use pattern in force today, and would simply develop a land and water use plan that conforms to the

existing zoning map. This plan was dropped for several reasons. First, the Zoning Code is nearly 20 years old and is considered to be out-of-date. Second, the Territory is comprised of three main islands with obvious land resource limitations, and the present Code does not adequately address how these resources should be preserved. Third, conflicts between the Coastal Zone Management regulations and the Zoning Code would not be resolved. Finally, there is widespread dissatisfaction with the present Code, as evidenced by the large number of rezoning requests that are applied for continually.

The maximum preservation alternative might also be termed a no-growth strategy. This would basically restrict growth to those areas that are either developed, undergoing new development, or already have development approval. This strategy could accommodate the growth that is expected to occur by the year 2000, but not much more. That is the limitation of this concept. Additionally, this type of strategy would tend to stifle development. This is not the intention of this new Plan. Rather, new growth handled in a responsible manner, is to be encouraged. Not only should the projected growth for the next 10 years be accommodated by any plan, a framework must be provided for growth management into the 21st century.

The Town Center approach focused on directing future growth into areas either currently being provided or planned for public services, including adequate roads, potable water and sanitary sewer service. The Urban Overspill approach called for a continuation of the trend of residential development moving away from the urban centers, spreading into more rural areas. This approach required the highest capital investment for public improvements, provided the most opportunities for land use conflicts and offered the least development options for post-year 2000 developments.

These alternative concept plans were prepared and offered for review and consideration by the public during a second series of Town Meetings on the island. Out of that process, a consensus for the final plan was reached which focused on the Town Centers concept. From that point, the preferred Town Centers plan was further refined through review by the St. John's Citizen Advisory Committee; DPNR planners (to insure consistency with existing and approved, but as yet unbuilt projects); other government agencies, such as WAPA and DPW, to insure consistency with their plans and major capital improvement projects; and other private landowners and private sector representatives.

Assumptions

In the development of the recommended Plan for St. John, the following assumptions were made.

- A population level of between 5,000 to 6,000 (permanent and seasonal) will have to be accommodated by the year 2000.
- Government does not have the ability to expand infrastructure island-wide within this planning period.

Preferred Concept: Town Center

This planning concept calls for the return to a development pattern which is more traditional. Such an approach emphasizes a small urban area settlement pattern with a strong neighborhood focus and identification as a viable development concept.

To realize the highest level of positive impact from this concept will require that the most intensive development be located in areas already serviced by roads, water and sewer, or where these facilities can easily be extended. It will also be necessary to more severely restrict urban growth outside the Cruz Bay area. This is not to say that development would be prohibited outside of the Cruz Bay area; rather, it is suggested that government initiatives, programs, resources, and energies be directed in support of this concept by upgrading and expanding the infrastructure in and around this defined area. It is important to understand that government spending decisions, especially in the area of infrastructure improvements and expansions, can provide a strategic means for guiding growth into those areas that the government deems is most appropriate to accommodate development. At the same time, other policy and regulatory measures would be taken to discourage development in floodplain, steeply sloped lands and other environmentally sensitive areas. These might include discouraging the expansion of water, sewer, or roadway development in certain areas.

The Cruz Bay area would be the only true urban center on the island. Urban growth and development is envisioned to expand under this scenario south to include Enighed and Contant and to extend to Chocolate Hole and Hart Bay. The eastern limits of this area are formed by the steeply sloped lands that eventually rise to form Gift Hill. The growth that occurs in Cruz Bay should take the form of increased amounts of mixed use development. Mixed use, within an urban context, refers to one building having a number of different, but compatible, activities under one roof (for example, shops on the first floor and housing located above it).

Within the context of any expansion or redevelopment of Cruz Bay, traffic and parking must be addressed. These issues are inevitably tied to St. John-St. Thomas boat traffic. Many St. Johnians work on St. Thomas every day and either a family member

will drop the individual off at Cruz Bay, or that person will park his or her car in the area all day and pick it up in the evening. The tourists coming over from St. Thomas for the day will either pick up a taxi at the waterfront or rent a car in the Cruz Bay area. All of these activities point out the need to store and move cars efficiently into and throughout this port settlement.

Care must be taken to preserve the spontaneity and casual charm of Cruz Bay in attempting to solve these problems. Additionally, the human and pedestrian scale of this area must not be lost; if anything, it must be enhanced. In any event, most of the traffic movements that are associated with the boats and all proposals for long-term parking must be focused well away from the waterfront. Attempts must be made to integrate the harbor with the town, introducing promenades and expanding upon the outdoor cafe concept that has been started at Wharfside Village.

The Coral Bay area is proposed to be a small, secondary service center. This area is envisioned to contain a convenience store and possibly some limited government services, such as a clinic or fire department sub-station. Envisioned to encompass no more than five acres, site selection and development will have to be done carefully, as there are floodplains in this area.

Generally, the East End of St. John is proposed to be developed in a low-intensity manner. The steep slopes and floodplains found throughout this part of the island impose significant natural constraints on development, as does the lack of infrastructure.

Obviously, there are no plans to alter any of the programs or activities of the National Park. However, the several in-holdings of privately held lands that would be subject to government review for building permits should be mentioned. Any development of these areas must respect the environmental constraints of their specific areas, such as the presence of floodplain and/or steep slopes. Additionally, there must be an awareness on the part of the private landowner that his land is in a special place and he should be sensitive to this.

The Town Center planning approach would be the most efficient in terms of using existing roads to their full capacity, and in providing a framework within which water and sewer services can be provided in the most cost-effective manner. Additionally, a strong neighborhood focus, or sense of place would be reinforced on the island.

Application of the Concept to St. John

Under the recommended Plan, Cruz Bay is proposed to remain as the only urban center on the island (Intensity District 5). The area

designated in this manner is the heart of Cruz Bay. This would promote pedestrian-oriented activities within the urban core and allow for more automobile-oriented development immediately outside of the town center in the area designated as Intensity District #4. This would help to reduce congestion levels around the waterfront area. The area designated as Intensity District 3, (running from Enighed Pond to Contant Hill and along Centerline Road to Pastory) will serve to accommodate moderate intensity development, including commercial development opportunities to serve residents of the outlying portions of the island so they do not have to traverse the urban core and its related traffic congestion to go shopping.

This district boundary corresponds with the future planned service area of the Cruz Bay wastewater treatment plant. Improvements planned to the existing facility by the Department of Public Works will sufficiently expand the plant's capacity to be able to adequately service this larger area. At the present time, however, the plant is operating beyond its capacity. Therefore, improvements to this facility must be incorporated into the Capital Improvements Program and implemented prior to approval of any significant future development activities requiring public sanitary sewer treatment service. The Turner Bay desalination plant, operated by WAPA, is currently operational and has sufficient capacity to serve future development anticipated within the Cruz Bay area.

Outside of the urban service area outlined as Intensity District 3, are several enclaves of higher intensity development designated as Intensity District 4. These are intended to include hotel/resort type developments that have a greater impact on the surrounding area due to their increased generation of traffic and their potential demand for public services, such as fire and police services. These areas include the Virgin Grand, Caneel Bay, Maho Bay and Concordia developments. All of these facilities, however, contain on-site potable water and wastewater treatment systems.

Areas designated as Intensity District 2, including Chocolate Hotel, Rendezvous Bay, Fish Bay and Bellevue are located outside of the water and sewer service areas and contain physical constraints such as steep slopes or floodplain. Many of these areas, however, are either already developed with single family low density housing or have been subdivided into lots for future residential use.

A secondary growth center (Intensity District 3) is proposed for the East End of the island in Coral Bay. This will allow for limited commercial activities to be further developed to serve the residents of this area. However, Port Authority plans to expand the boatyard facilities, including a restaurant, wastewater treatment plant and a desalination or reverse osmosis

facility, would pose a rather dramatic change for the community. The remaining areas are designated as either Intensity Districts 1 and 2 to reflect the difficult terrain, floodplain, lack of good road access and lack of public services.

The Cruz Bay water area has been designated as Intensity District 6W in its northern portion and Intensity District 2W for the remainder. This would allow for passenger boats and other more industrial type shipping activities to take place in The Creek area. The rest of Cruz Bay, including the present passenger ferry pier, would be downgraded to be an area of low intensity boating activity, including vessel storage for fishermen and research institutions. All of this is to take into account the Port Authority's plans to transform Enighed Pond into the main industrial port area for St. John. Accordingly, Enighed Pond has been designated as an Intensity District 6W.

Great Cruz Bay has been designated an Intensity District 3W, which would allow for the mooring and anchoring of pleasure craft. The same designation has been given to Coral Bay.

ST. CROIX LAND AND WATER USE PLAN

Existing Land Use Patterns

The demise of the sugar cane industry and the introduction of two major employers, Hess Oil Virgin Island Co. and Harvey Alumina (VIALCO), have dramatically changed the land use pattern on St. Croix over the past thirty years.

Until the 1950's, land use patterns occurred as two basic types; rural areas and urban centers. In the rural areas, the majority of the land was used for the production of agricultural crops, grazing of livestock, homesteads and settlements of agricultural workers (Dookhan, 1974). Most of the produce from the rural areas was transported to the Christiansted and/or Frederiksted for sale in open markets, stores or for export (Emanuel, 1991).

In the towns, where the majority of the population resided, land use patterns consisted of residential, commercial and some light industrial activities. It was common to find grocery stores, movie theaters, shoe repair shops, rum shops, restaurants and banks located in, or in close proximity to residential neighborhoods. Furthermore, it was quite common to find single buildings undergoing dual uses, with residences upstairs and some type of commercial activity downstairs (Emanuel, 1991). This mixed use pattern afforded the opportunity for many residents to shop and work close to their homes. Thus, for many, a car was not a necessity.

In short, the development pattern of the towns prior to the 1960's was based principally on the social and economic requirements of the town residents and functioned primarily to their benefit. As a result, neighborhoods became complete communities, where most basic needs were met.

By 1970, two major industries, namely Hess Oil Virgin Islands Co. and Harvey Alumina (VIALCO), were established. In addition to the above, there were electronics, pharmaceutical, textile and rum plants in operation on the island.

This profusion of new economic opportunities was followed by demographic and locational changes. Between 1960 and 1970, there was a population increase of 211.7% (V.I. Planning Office, 1978). During the same period, the urban population dropped 9.5% from 12,880 to 12,220, while the rural population grew 503.5% from 3,321 to 16,720 (V.I. Planning Office, 1977).

The burgeoning population growth, and the promise of continued

economic opportunities spurred a great demand for single family homes and associated services. Many of the residential developments which resulted to meet the demand occurred in relatively flat and/or centrally located areas formerly used as agricultural lands and/or open spaces. As was the case in earlier times, services were necessary to be located in proximity to neighborhoods. Intensive construction of large scale commercial centers (e.g., Sunny Isle/Sion Farm area) and road side commercial activities resulted. Thus, exponential population growth and associated commercial activities brought major changes to the traditional land use pattern of the large rural areas.

It must be noted that the rapid growth which occurred during the 1960's was uncontrolled by any comprehensive planning strategy and limited only by a feeble governmental regulation, the Zoning Ordinance of 1961.

Currently, St. Croix maintains three major activity centers: Christiansted, Frederiksted, and the Sunny Isle/Sion Farm area. Proximate to each of these areas are several neighborhoods. The Sunny Isle/Sion Farm area and Frederiksted are connected by the Melvin Evans Highway and Queen Mary Highway (Centerline Road). Along both highways there is a sporadic mix of housing and highway oriented commercial activities. The traditionally rural north, west and east end areas remain as such. These areas are not connected to public water and sewer lines and are typically steeply sloped. The south central section of the island has developed as an industrial area. The two major industries, Hess Oil Virgin Islands Co. and VIALCO, along with the public airport and landfill are located in this area. Most of St. Croix's resort and vacation home development are located at various coastal/beach front locations, with the majority of these on the island's east end.

Over the past thirty years, St. Croix has seen a land use pattern which reflects a dispersion of the population. New neighborhoods, such as Sion Farm, Mon Bijou and Strawberry Hill, developed as the population increased. Today, this continues in Barren Spot and LaReine and is beginning in the Frederikshaab and the Mt. Welcome/Recovery Hill areas. Concurrently, Christiansted, Hess Oil Virgin Islands Co./VIALCO, the Sunny Isle/Sion Farm area, and to a lesser degree, Frederiksted are the major employment centers. Thus, as the population disperses, there will be, in many instances, a greater dependence upon the automobile to get to and from work.

Thus far, much of the commercial growth necessary to service the growing population has occurred along major roadways such as Queen Mary Highway. This type of development, which includes shopping centers, gas stations, restaurants and furniture stores, is both dependent upon and made lucrative by the high volume of traffic. However, this type of growth may not be appropriate in all areas,

as it has a tendency to encourage other new growth in its proximity. For St. Croix, this presents two particular problems. First, this economically driven development policy will make it much more difficult to implement a meaningful agricultural expansion program. Not only is much of the land along Queen Mary Highway relatively flat, but it contains some of the best suited soils for farming as well. Secondly, this area also contains most of St. Croix's groundwater recharge areas. To allow random commercial and residential development to continue in this area, when potable water resources are so limited, would not be in the best interest of the residents of St. Croix.

St. Croix still retains a great deal of open space. A large portion of this land (more than 16,000 acres, according to the Island Resources Foundation land use survey performed in 1989) is dedicated to agricultural uses, including crop production and grazing of cattle. The territorial Government holds and leases parcels of the Harvland properties, which are located along Queen Mary Highway. Large portions of land are also dedicated to agricultural usage along the South Shore Road from Estate Granard to Estate Sally's Fancy.

The current land use pattern in St. Croix exhibits the highly dispersed population. The historic pattern has been supplanted with a pattern which exhibits a heavy dependence upon the automobile. One result is that the traditional neighborhood with services in close proximity is not as prevalent. This has also resulted in commercial development along major roadways to capitalize upon the heavy automobile traffic. Thus, the land use pattern found today is a combination of four distinct phenomena: first, the historic growth pattern up until the 1960's; second, the increased economic opportunities; third, the dramatic population increase which has occurred since the 1960's; and last, the automobile, which has made dispersed development possible.

Land Demand Analysis

Based on the projected population growth between 1990 and 2000, an analysis of future demand can be made for residential, hotels and resorts, commercial, industrial, agricultural, parks and recreation uses. The following table projects the anticipated population growth for St. Croix to the turn of the century.

**Table 20 Resident Population Projections, St. Croix:
1991-2000**

Year	Population	Additional Growth
1970*	35,945	
1980	49,725	
1990	50,139	841
1991	50,980	855
1992	51,836	870
1993	52,706	884
1994	53,590	899
1995	54,489	914
1996	55,403	930
1997	56,333	945
1998	57,278	961
1999	58,239	977
2000	59,217	994

Sources: Department of Commerce, Bureau of the Census. Census of Population, 1980, 1990.
Land Use and Housing Elements. U.S.V.I., 1997.

Note: 1991-2000 estimates were computed using 1970 (adjusted) - 1990 growth rate.

* There are concerns that the 1970 Census population data for St. Thomas was inaccurate. SPG used adjusted 1970 population figures commonly accepted in the Territory.

That first step performed in this exercise was to determine the current amount of land being used in the various land use categories. Calculations were made from the existing land use map prepared by Island Resources Foundation in 1989. These data revealed that about 27,440 of the 53,833 acres that make up the island of St. Croix, or approximately half of the land area, is currently being utilized or occupied with some use. Of this, approximately 5,630 acres, or almost 20 percent, of the land that has been developed is calculated as being in residential use. About 390 acres is in retail/commercial use, not including the stores and shops in downtown Christiansted and Frederiksted. This area, which occupies nearly 200 acres and includes businesses, hotels, office, some housing, parks, and a limited amount of warehousing and storage space has been designated as urban on the existing Land Use Map. Resorts and hotels occupy about 190 acres of land, while the public facilities and institutions on the island (schools, hospitals, the University of the Virgin Islands, etc.) currently claim approximately 1,175 acres. Industrial and manufacturing uses, which include the HOVIC and VIALCO operations, amount to more than 2,100 acres at the present time. Parks and recreational facilities occupy about 1,340 acres. Agricultural activities occupy 16,130 acres, or almost 30 percent of St. Croix's land area.

There are approximately 26,400 acres of vacant or undeveloped land on St. Croix. The relationship between the amount of land in each land use category and the current population was determined to

establish a starting point to determine what the land utilization picture might look like 10 years hence. These figures are shown in the following table and are based on an estimated current population of 50,139 (U.S. Census, 1990).

Table 21 Current Acreage/Population Relations by Land Use Type, St. Croix

Land Use	Persons/Acre
Resort/Hotel	264
Retail/Commercial	129
Industrial/Manufacturing	24
Residential (Low-Density)	15
Residential (Medium-Density)	28
Residential (High-Density)	101
Agriculture	3
Parks and Recreation	37
Vacant Land	2

Source: Island Resources Foundation, 1989.

The existing land use pattern indicated in the table above exhibits a higher allocation of commercial space than St. Thomas. This is due to the land-consuming nature of the automobile-oriented shopping malls (such as Villa LaReine and Sunny Isle) on St. Croix. The industrial allocation per population is the highest in the Territory reflecting the presence of the HOVIC refinery, VIALCO and other associated industrial uses.

Hotel and Resort Land Use

Hotel and resort development cannot accurately be projected based on a land use/population basis. As previously discussed in the population projections, the number of hotel rooms/seasonal rental units has been projected for the planning period based on the projected seasonal population expected by the year 2000.

Table 22 Projected Peak Daily Seasonal Population, St. Croix: 1991 - 2000

Year	Peak Daily Seasonal Population
1990	3,281
1995	4,282
2000	5,185

Source: V.I. Department of Economic Development and Agriculture, Bureau of Economic Research
 V.I. Public Finance Authority Transportation Trust Fund Revenue Projections 1989-2000,
 The WEPA Group, 1989
 Financial Feasibility Study New Terminal Complex Cyril E. King Airport St. Thomas, USVI,
 Landrum and Brown, 1989

According to this data, the demand for hotel room/seasonal units (including condominiums and villas) on St. Croix is expected to increase from 1,382 in 1990 to approximately 2,183 by the year

2000 (Small Area Population Modeling for the U.S. Virgin Islands, Strategic Planning Group, Inc. 1991). This translates to an increase of 800 units over the next ten years. The number of hotel/seasonal units already anticipated through existing development proposals far exceed the proposed demand by 1,537 rooms. Projects approved include The Club St. Croix, Sugar Bay Coakley Bay, and Green Cay.

Table 23 Hotel/Seasonal Unit Projects Approved or Application Pending, St. Croix

<u>Hotel/Seasonal Condominium Projects</u>	<u>Number of Units</u>
The Club St. Croix	309
Sugar Bay	588
Coakley Bay	350
Palm Shores	87
Ensenada	147
Green Cay Resort	550
Eden Beach	60
Tamarind Reef	46
Total	2,337

Source: V.I. Department of Planning and Natural Resources, 1990.

Commercial Land Use

To determine an approximate demand for future commercial land use activity, commercial development has been projected based on the existing acreage/population ratio. Utilizing this ratio of one acre of retail/commercial use per 128 population translates into an additional demand for approximately 71 acres of commercial land by the year 2000 on St. Croix. This is based upon a projected increase of 9,078 permanent and seasonal residents during the same period. Most of the retail/commercial activity will continue to be focused mid-island where the majority of the growth is occurring, as well in the Christiansted and Frederiksted areas.

**Table 24 Commercial Projects Approved or Application Pending,
St. Croix**

Proposed/Approved Commercial Development	Total Acreage
Estate Solitude (gas station, auto repairs, office, storage facilities)	0.4
Sunshine Shopping Center	18.7
Oneale's Commercial Center (retail stores, restaurant, nightclub)	2.0
Orange Grove Shopping Center	7.2
Oasis Commercial Center	2.0
All Island Bottling Co.	1.0
VIBR Inc.	0.6
United Shopping Center	1.0
Diamond Crest Ltd.	1.2
D.U. Corp.	0.2
Island Coast Ice Cream, Inc.	0.5
TOTAL	34.8

Source: V.I. Department of Planning and Natural Resources. 1990.

This ratio of commercial acreage to projected population assumes that the current relationship of one acre to 128 residents is working reasonably well on St. Croix today and will continue to do so in the future. It is difficult to predict with a high degree of accuracy as to what the future demand will be for retail commercial space, and it is even harder to project these needs in a community where so much of the economy is based on tourism. The current ratio includes the gift shops in Christiansted and Frederiksted that cater primarily to the tourists, but does not include the hotels and resorts. All that can be done is to analyze the current retail situation and make a determination as to whether there is an adequate range of stores and shops to meet the needs of the people. This has been done as part of the Overall Economic Development Program for the Territory. This study had determined that there is a reasonable provision in the various retail components. Therefore, it may be assumed that this level of provision will continue for the foreseeable future.

There is more than enough land to accommodate the projected 71 acres of additional commercial land that is expected to be needed by the year 2000. Most of this additional land is expected to be developed in Intensity Districts 3, 4, and 5, where the greatest numbers of people are expected to reside. As there are more than 26,000 acres of undeveloped land, it can be seen that there will

be no problem in meeting in this additional need.

Land that is needed for new retail facilities should be easily accessed from roadways and be within or adjacent to significant concentrations of housing. To the extent that it can be accomplished, creating a physical interrelationship between homes and shops where people can walk is to be encouraged. Certain retail functions, however, have a definite highway orientation and should be kept there. They include such uses as gasoline stations, auto repair facilities, building supplies, etc. Not only should they be relegated to highway areas, they should also not be allowed in the urban centers. If they were to be built in downtown areas, this would be counterproductive to achieving a viable core area. Downtown areas, to be successful, must allow for the freest possible movement of pedestrians. If a gasoline station were to be built in downtown Christiansted, this would create a "hole" in a block that would force pedestrians to walk past an area that is not intended for them to use. If this were to be allowed, and then to be repeated any number of times over, it would soon result in the death of the urban core area.

If the Comprehensive Land and Water Use Plan and the accompanying V.I. Development Law are followed, there should be no real conflicts to be dealt with, provided that the performance standards are rigidly enforced. However, it will be necessary to pay special attention to any proposal to build any auto-related facility (e.g., gas station, automotive repairs, car dealerships, etc.) or dry cleaning operation that is within close proximity to any groundwater recharge area. These types of activities can quickly contaminate groundwater resources and render them useless for years.

INDUSTRIAL LAND USE

The demand for industrial land on St. Croix over the next decade will most likely increase. This prognosis is based on interviews that were conducted in conjunction with the preparation of the Territory's Overall Economic Development Program in 1991. These interviews, conducted with business leaders throughout the Territory, revealed that there is a significant lack of warehousing and distribution facilities throughout the Virgin Islands. Projecting from the existing one acre/23 people ratio would produce a demand figure of approximately 395 acres of additional industrial land between 1990 and 2000. However, this sector of the Virgin Islands economy has been losing employment since the 1980s. Therefore, by examining a more realistic employment based projection, a better estimate can be made for actual demand of industrial space. By comparing the relationship between manufacturing employment to total population and factoring in industrial space standards for new jobs, a calculation indicates that approximately 200 to 250 acres of new industrial land will be needed on St. Croix by the year 2000.

This estimate does not include any projections for additional employment at VIALCO, HOVIC, or the airport. It would appear that these facilities have sufficient lands to accommodate any additional personnel that might be hired over the next ten years. The majority of the new acreage in this category is anticipated to be in the warehousing and distribution sector.

RESIDENTIAL LAND USE

As was stated in the discussion for St. Thomas concerning how much residential land will be needed to support the projected year 2000 population, the same statements hold true for St. Croix. It is necessary to begin with the year-round population that is expected to be residing on the island at the turn of the century. This figure has been projected to be 59,217, an increase of more than 9,000 since 1990. The seasonal population demand for housing has been factored into the discussion of need for hotel room/seasonal units. Therefore, only projected year-round housing needs to the year 2000 are discussed in this section.

The residential component of existing land use currently amounts to 5,630 acres, according to the 1989 Island Resources Foundation survey. This was about 27 percent of all of the land in use on St. Croix, including agriculture. If the nearly 9,500 acres in this category is excluded, and only urban uses are considered, then residential land accounts for half of land actively in use.

The acreage figures were calculated for low, medium, and high density housing by IRF. Low density housing covered almost 3,370 acres; medium density residential areas occupied approximately 1,765 acres; and high density dwelling units accounted for about 495 acres. According to figures recently released from the 1990 Census, there are about 17,525 dwelling units on St. Croix. These units have not yet been broken down into single or multi-family classifications. Therefore, as was the case with St. Thomas, it is necessary to make some assumptions to establish a working number for the amount of housing in each category. This must be done to establish the framework for the housing needs that are expected to become manifest over the next ten years.

The 3,370 acres classified as low density residential has been assumed to accommodate, on average, 1.5 dwelling units per acre. This results in a figure of about 5,055 homes in the low density classification. For medium density residential development, an average intensity of 3.0 units per acre has been assumed. This yields approximately 5,295 homes. The 495 acres in high density residential use has an assumed density of ten units per acre. This results in a figure of about 4,950 high density units. The remainder of the units (2,225) are assumed to be in the Christiansted and Frederiksted urban areas. These latter units, for the purpose of establishing the current density breakdowns,

are assumed to be high density units. The existing housing units for St. Croix, by density types, is shown in the following table:

Table 25 Estimated Dwelling Units by Density Type, St. Croix: 1990

Density	No. of Units	Percent of Total
Low Density	5,055	28.8
Medium Density	5,295	30.2
High Density	7,175	41.0
TOTALS	17,525	100.0

Sources: U.S. Bureau of the Census, 1990.
Island Resources Foundation, 1989.

It is anticipated from now to the year 2000 that residents will be moving increasingly into more compact housing arrangements. The primary reason for this will be economic in nature. The cost of land and building construction in the Territory have traditionally been higher than in the continental United States, and this relationship appears to be widening. The preferred housing style among native Virgin Islanders is either their own single-family home on their own lot or a two-family structure that they own. Economic reality would seem to dictate, however, that this may become less and less attainable in the future. This is evidenced by the growing demand for affordable housing in the Territory. The rapid increase in housing prices over the past decade has priced many Virgin Islanders out of the single-family housing market.

With this in mind, a projection has been made regarding how the expected 9,078 new residents of St. Croix will be housed by the year 2000. It is also expected that the trend of declining household size that has existed for several years in the Territory will continue. In 1990, the average household size on St. Croix was 2.86 persons per dwelling unit. This means that more than 6,100 new housing units will be needed to accommodate the projected year 2000 population. The following table indicates the manner in which these units are expected to be required.

Table 26 Estimated Dwelling Units Demand by Density Type, St. Croix: 2000

Density	No. of Units	Percent of Total
Low Density	924	15.0
Medium Density	2,465	40.0
High Density	2,773	45.0
TOTALS	6,162	100.0

Source: Strategic Planning Group, Inc., 1991.

Having established this estimated breakdown of housing unit types that will have to be built over the next ten years, and assigning to these units the density standards that are currently assumed to exist on St. Croix, a projection can be made of the amount of land that will be needed to accommodate these 6,162 homes. This acreage is presented in the following table. It is estimated that a maximum demand of more than 1,700 acres of residential land will be felt by St. Croix over the next ten years.

Table 27 Estimated Residential Needs by Density Type, St. Croix: 1991-2000

Density	No. of Units	Average Density	Acreage Requirements
Low Density	924	1.5 D.U./Acre	616.0
Medium Density	2,465	3.0 D.U./Acre	821.7
High Density	2,773	10.0 D.U./Acre	277.3
TOTALS	6,162		1,715.0

Source: Strategic Planning Group, Inc., 1991.

Based on the overall trend in population gain and loss between 1980 and 1990 by planning district, relative shifts in population become evident. By analyzing the difference between 1980 and 1990 Census counts, areas of growth can be differentiated between those areas actually losing population and those gaining. These figures, as well as projections to the turn of the century, are presented below.

Table 28 Planning District Population Growth, St. Croix: 1980-1990 and Projected Population for 2000

Planning District	Population		Projected 2000
	1980	1990	
Sion Farm	12,563	11,883	13,089
Southwest	7,067	7,840	10,093
South Central	6,314	7,425	10,046
North Central	5,771	5,495	6,096
Anna's Hope	3,325	3,663	4,686
North West	5,714	4,828	4,647
East End	1,648	1,740	2,141
Christiansted	3,375	3,199	3,532
Frederiksted	3,948	4,066	4,887
Total	49,725	50,139	59,217

Sources: U.S. Census of Population and Housing, 1980 and 1990. Strategic Planning Group, Inc., 1991.

The data indicate that the largest increase in population was in the south central portion of the island. Much smaller gains were

made in the East End, Southwest, Anna's Hope, and in the traditional town center of Frederiksted. The largest loss in population was experienced in the areas of the Northwest and Sion Farm.

One of the most significant factors in St. Croix's relatively stagnant growth between 1980 and 1990 was the loss in manufacturing jobs at the HOVIC refinery and in the watch industry.

AGRICULTURE/PARKS AND RECREATION/VACANT LAND

The more than 16,000 acres of land classified as agricultural represented a total of 168 farms (U.S. Census of Agricultural, 1987). Only ten percent, or 1,619 acres, was designated as being cropland (Ibid). The remainder was, in the main, pasture or grazing land. Dairy operations and the raising of Senepol cattle are major agricultural activities on St. Croix. While farming activities are scattered throughout the island, the largest areas devoted to this activity are in the southeast sector and the northwest quadrant. Smaller areas of agriculture are to be found in the central and western portions, in the path of the soils that are rated best for crop production (U.S. Soil Conservation Service Soils Survey).

The economic viability of the agricultural sector is threatened by a number of constraints. These include:

- water shortages during certain period of the year;
- unavailability of land for use by agricultural producers;
- tight agricultural labor supply;
- high cost and unavailability of agricultural inputs; and,
- limited number of young practicing farmers.

At the same time, there is a growing need for increased agricultural production, both for use in the local economy as well as for export (U.S. Virgin Islands Overall Economic Development Program, 1991). The territorial Government has a stated policy to expand the agricultural component of the local economy. To support this policy, those lands that have the greatest potential for agricultural development should be preserved for this purpose to the greatest extent possible.

Parks and recreational facilities are scattered throughout the island, although they tend to be found in greater numbers in and around the population centers. The recreational areas that are most successful are the ones that are located closest to the people they serve. However, there is a lack of adequate facilities on St. Croix. The 1,343 acres that Island Resources

Foundation included in this category in 1989 is somewhat misleading. For example, more than 200 acres are associated with the golf course and other amenities at the Carambola resort. These, although they are truly recreational facilities and were properly classified as such, are not readily available or accessible to the majority of the residents of St. Croix.

More than 26,000 acres were categorized by Island Resources Foundation in 1989 as undeveloped or unimproved. Much of this land would be very difficult to develop, as it is associated with the steeply sloped land in the northwest, central, and eastern sectors of the island. There are, however, considerable amounts of other lands located between Christiansted and Frederiksted that are reasonably flat, not in the floodplain, and do not contain soils with high agricultural suitability. These areas are well-suited for future development.

Public Participation and The Planning Process

The public outreach Town Meetings elicited many concerns from St. Croix's public on a host of issues. These ranged from the need for affordable housing, better schools, fire and police services to more parks and recreation facilities, improving water quality and the preservation and expansion of agricultural lands. The relative significance of these planning issues on St. Croix are presented in the following figure.

Table 29 Relative Impact of Planning Process, St. Croix

CATEGORY SIGNIFICANCE	DEGREE OF
Affordable Housing	•
Schools	•
Fire, Police	•
Health Facilities, EMS	•
Parks, Recreation	—
Water Pollution	—
Preserve and Expand Agriculture	—
Traffic, Roads	○
Public Sewage	○
Potable Water	○
Drainage, Flood Control	○
Solid Waste	○

Legend		
• Highly Significant	— Significant	○ Less Significant

Figure 3: St. Croix Relative Impact of Planning Process.
Source: Tabulation of Survey, Strategic Planning Group, Inc., 1990.

Based on the initial community input at the public outreach Town Meetings, a series of alternatives concept plans were prepared and presented to the public on St. Croix. The citizens' concerns aired at the public outreach meetings resulted in many of the ideas and elements employed in the preparation of these plans. The alternative concepts prepared were the Town Center, Urban Overspill and Linear approaches. The intent in all the alternatives presented for consideration was to guide future development into those areas best suited for it, allowing for a certain amount of flexibility to respond to natural, economic, and market forces.

Beside the proposed alternatives, other concepts were reviewed, including a Do Nothing and a Maximum Preservation Approach. They were not deemed appropriate for further consideration for a variety of reasons. The do-nothing concept would allow new housing, commercial resort, and industrial development to occur

under the present zoning. The Government would do nothing to change the proposed land use pattern in force today, and would simply develop a land and water use plan that conforms to the existing zoning map. This plan was dropped for several reasons. First, the Zoning Code is nearly 20 years old and is considered to be out-of-date. Second, the Territory is comprised of islands with obvious land resource limitations, and the present Code does not adequately address how these resources should be preserved. Third, conflicts between the Coastal Zone Management Regulations and the Zoning Code would not be resolved. Finally, there is widespread dissatisfaction with the present Code, as evidenced by the large number of rezoning requests.

The maximum preservation alternative might also be termed a no-growth strategy. This would basically restrict growth to those areas that are either developed, undergoing new development, or already have development approval. This strategy could accommodate the growth that is expected to occur by the year 2000, but not much more. This is the limitation of this concept. Additionally, this type of strategy would tend to stifle development. This is not the intention of the new Plan. Rather, new growth handled in a responsible manner is to be encouraged. Not only should the projected growth for the next 10 years be accommodated by any plan, a framework must be provided for growth management into the 21st century.

The Town Center approach focused on directing future growth into areas either currently being provided or planned for public services, including adequate roads, potable water and sanitary sewer service. The Urban Overspill approach called for continuation of the trend of residential development moving away from the urban centers, spreading into more rural areas. This approach required the highest capital investment for public improvements, provided the most opportunities for land use conflicts and offered the least development options for post-year 2000 development. The Linear approach concentrated development in the relatively flat, more easily developed areas along the central spine of the island. However, it also had the greatest negative impact on farming areas, since the prime agricultural lands are located in the area, as well as the major groundwater recharge areas.

Through a second series of public outreach meetings, a community-based consensus for the final plan was reached that focused on the Town Centers concept. From that point, the preferred Town Centers Plan was further refined through months of scrutiny and review by the St. Croix Citizens Advisory Committee; DPNR planners (to insure consistency with existing and approved, but as yet unbuilt projects); other Governmental agencies (to insure consistency with their plans and major capital improvement projects) and with private sector trade representatives, such as the Board of Realtors.

Assumptions

In the development of the concept plans, the following assumptions were made for each alternative:

- The Christiansted Bypass on St. Croix, that will tie into the Melvin Evans Highway, is expected to be completed within the near future.
- A population level of between 55,000 to 70,000 residents (permanent and seasonal) will have to be accommodated by the year 2000.
- The western extension of the Melvin Evans Highway on St. Croix would not be built. This recommendation has been made because, if it were constructed, it would encourage the development of environmentally sensitive areas at Sandy Point and Westend Saltpond. To improve highway accessibility in Frederiksted from the south it is proposed, rather, that existing highways be improved and widened.
- The Government does not have the ability to expand infrastructure island-wide within this planning period.

Preferred Concept: Town Center

This planning concept calls for the return to a development pattern which is more traditional. Such an approach emphasizes a more compact settlement pattern with higher intensity core areas which service lower intensity residential and commercial areas.

This concept requires the retention of the primary agricultural lands for crops and pasture, as well as the preservation of the steeply sloped lands and floodplains. There are sound environmental and economic reasons for implementing such a land use pattern, and there is the additional benefit of creating an aesthetically pleasing environment.

To achieve the greatest measure of efficiency and highest level of positive impact from this concept will also require that the most intensive development be located in areas already serviced by roads, water and sewer, or where these facilities can easily be

extended. It will also be necessary to more severely restrict urban growth outside of the growth centers. This is not to say that development would be prohibited outside of the proposed town centers; rather, it is suggested that Government initiatives, programs, resources, and energies be directed in support of this concept by upgrading and expanding the infrastructure in and around Sion Farm/Sunny Isle, Frederiksted, and Christiansted. At the same time, other policy and regulatory measures would be taken to discourage development in prime agricultural areas, floodplains, steeply sloped lands, and other environmentally sensitive areas. These might include discouraging the expansion of water, sewer, and roadway development in certain areas.

To develop and maintain infrastructure (e.g., roads, water, sewer, drainage facilities, etc.) costs money. Every unit of government is painfully aware that the federal participation in the development of these facilities, which used to be substantial, has been reduced to a trickle and, in some cases, has stopped entirely. This fact of life has forced local governments to think harder and more creatively as to how they will spend their revenues on capital projects. And, because the Virgin Islands' economy is so dependent on tourism (and its concomitant "boom and bust" cycles), the Government's task is more difficult. Not every new development on St. Croix will necessarily be able to be provided with public and/or sewer facilities. Not every new project will be able to get the Government to widen the roadway serving it to accommodate its projected traffic impacts. A more rational planning approach is necessary, one that maximizes the utilization of available infrastructure and minimizes the need to expand service provisions all over the island. This has been the underlying concept and justification in the preparation of the Comprehensive Land and Water Use Plan for St. Croix.

CHRISTIANSTED

Christiansted would continue to be the primary urban center on the island. Urban growth and development is envisioned to expand under this scenario southward to the ridge line in the area of Peters Farm, Friedensthal, and Orange Grove. The growth that occurs in Christiansted should take the form of increased amounts of mixed use development. Mixed use, within an urban context, refers to one building having a number of different, but compatible, activities under one roof (for example, shops on the first floor and housing located above it).

The east side of Christiansted is also proposed to be expanded, out to the Tide Village area. Utility expansion to Tide Village has already been programmed by the Department of Public Works; therefore, this sector will be able to accommodate additional development. Further, an eastward expansion of this urban area will serve to better balance the peak hour traffic flows in and out of Christiansted, which are becoming increasingly worse.

Within the context of any expansion or redevelopment of Christiansted or Frederiksted, care must be taken to preserve the integrity of the historic structures. In both towns, several buildings have been carefully restored to their original state, and others have been changed from their original use with sensitivity so that the architectural integrity has been maintained.

FREDERIKSTED

In the case of Frederiksted, considerable restoration is necessary in the heart of the town. Frederiksted town contains many buildings that, if property rehabilitated within the context of an overall plan, could make the community much more attractive. This alternative proposes that the outer limits of the town be expanded and that higher density uses be developed along its perimeter. The scale and character of this new development should be compatible with that of the town's historic core. Increased development around the edges of the community can have the effect of supporting the historic rehabilitation efforts.

By developing additional housing either within walking distance or a very short drive of the downtown area will have the effect of building in a captive audience. These new residents will have the need to purchase groceries, have their prescriptions filled, or buy home or personal products. If they can easily do it in downtown Frederiksted, this income to the shopkeepers and store owners will provide them with the revenues to improve and upgrade their properties.

SION FARM/SUNNY ISLE

The intensive land uses will be concentrated around the Sion Farm/Sunny Isle area to avoid the negative impacts of sprawl. It will be more difficult to establish a town center identity in this area. Many of the existing land uses have a definite orientation and, the activities are dispersed. The development of vacant lots with higher density housing will have the effect of supporting the commercial development that exists and possibly reduce dependence on the automobile. Therefore, this scenario proposes that this sort of strategy be employed in the development of this area. Multi-family housing (apartments, townhouses, etc.) is to be encouraged in this area, as well as single-family dwellings on small lots. The building up of residential densities in this sector will be supportive of existing retail operations and encourage new businesses to develop here. The addition to the Melvin Evans Highway of the Christiansted Bypass should result in a reduction of traffic problems in this area by removing the traffic that is destined for other parts of the island from the local roads. This should enable additional development to occur without adversely impacting local traffic conditions.

SOUTH SHORE INDUSTRIAL AREA

The south central portion of St. Croix, where VIALCO, the Hess Oil Refinery, the Alexander Hamilton Airport, and the island's landfill operation already exist, are proposed for continued industrial development. It will be counter-productive to allow additional lumber yards, warehouses, or small fabrication operations along some of St. Croix's main routes. Because of this, no matter which alternative is selected, industrial, warehousing and distribution facilities should be restricted to the South Shore Industrial Area.

The band of land between Melvin Evans Highway and Queen Mary Highway from the Anna's Hope area to Frederiksted is expected to accommodate much of the new development that will occur over the next ten years. The roadway system should be able to handle the anticipated additional traffic, and public water and sewer service is generally available. North of Queen Mary Highway, where considerable amounts of higher quality agricultural soil exist, the proposed land use pattern is much lower in intensity and is intended to encourage more farm operations.

Due to the environmental sensitivity, steep slope conditions, and groundwater recharge functions, the rain forest area in the island's northwest sector should be preserved. However, there may be some opportunities in carefully selected sites to allow for homes to be built in a cluster design technique. On St. Croix's East End, a relatively low intensity pattern is likewise proposed. The presence of considerable amounts of steeply sloped land and a lack of public water and sewer facilities make this area less attractive for intensive development.

The Town Centers alternative would be the most efficient in terms of using existing infrastructure (water, sewer, roads) to accommodate future development. Allocating more land for higher density housing and urban uses and locating these areas where the roadways and other services already exist will be most cost-effective. This concept also calls for the maximum preservation of good agricultural land and areas of groundwater recharge and collection. Additionally, a strong neighborhood focus, or sense of place, would be reinforced on the island and residents would continue to identify with their own particular geographic area.

Application of the Concept to St. Croix

Under the recommended plan, both Christiansted and Frederiksted maintain and expand their roles as the major towns of St. Croix.

Intensity District 5 encompasses the presently built-up portion of central Christiansted. This would allow for infilling of vacant parcels in this area with intensive mixed-use development, as well

as high density housing. South of this area, to the edges of Herman Hill, Recovery Hill, and Mount Welcome, Intensity District 4 is proposed. This will allow for reasonably high residential densities that would be supportive of the downtown commercial area by putting greater numbers of residents within close proximity of the stores and shops. It could also have the effect of reducing automobile traffic in the central area, which is becoming an increasingly severe problem. West of the town center, along Christiansted Harbor, and including the Orange Grove and Golden Rock areas, Intensity District 4 is also proposed. The mix of uses that currently exist in this area include WAPA's facilities, some condominium developments, as well as low-cost apartments.

The heart of the town of Frederiksted, the urban center of the west end of the island, is designated as Intensity District 5. North to Mahogany Road and east of town, Intensity District 3 is proposed that would allow for moderate-intensity housing, along with a wide range of neighborhood functions and supporting activities. This Intensity District 3 area includes LaGrange and Prosperity to the north and Mars Hill, Stony Ground, and Hannah's Rest to the east and South. This is a reflection of the character of the general existing development pattern in these areas. The area due south of Frederiksted, along the main road leading into Town from Queen Mary Highway (Centerline Road) and Melvin Evans Highway, including Two Brothers and the western portions of Mars Hill, Stony Ground, and Hannah's Rest, has been designated as Intensity 4, which envisions that high-intensity housing and a full range of community services and facilities would be established. West of this area, immediately south of the town center and covering the west side of Two Brothers and most of Smithfield, is an area designated for Intensity District 3. The extreme western portion of this area south of Frederiksted encompassing Westend Saltpond is proposed for Intensity District 1 because of its environmental sensitivity.

The Sion Farm/Sunny Isle area is defined as a secondary urban growth center under this concept. The core has been designated as Intensity District 4, meaning that commercial facilities, offices, and high-intensity residential development would be encouraged. All of these activities would support the development pattern that has been evolving here over the last 10 years. This District 4 area extends eastward to Anna's hope, south to include Peter's Rest and Castle Coakley and westward to Diamond and Strawberry Hill. This would allow for a mix of single-family homes and some apartment complexes, along with a full range of community facilities. Not only would this support the overall goals of this concept, it would improve living conditions in the area by encouraging uses here that are currently non-existent.

Immediately north of the core area, encompassing the land between Sion Farm and Constitution Hill, has been designated as Intensity District 2 because of the steep terrain that presents development

difficulties. West of this area and also north of the Sion Farm/Sunny Isle core, the land has been designated as Intensity District 1. This area, which includes the northern edge of Strawberry Hill and Limetree, also have severe slope conditions that preclude any intensive development possibilities.

An important feature of this Plan is the preservation of agriculturally suitable lands and the rainforest, while generally maintaining a higher amount of green space throughout the island.

The majority of the land envisioned for agricultural development generally lies north of Queen Mary Highway and encompasses Mountain and Mint, St. George's and Sally's Fancy, Lower Love, Castle Burke, Upper Love, Jealousy, and Fredensborg. Within these areas are found the Anguilita-Fredensborg-Sion soil association which, although generally not suitable for cultivated crops, is suited for pasture and livestock grazing (U.S. Soil Conservation Service Soil Survey, 1970). The Fraternidad-Aguirre-Glynn association is also located in this sector and is suitable for cultivated crops and pasture (Ibid).

Most of these areas have been designated as Intensity Districts 1 or 2, which are intended to encourage agricultural activities while, at the same time, discouraging uses that would not be compatible.

Water use designations have been developed for selected bays and harbors around St. Croix. The designations have evolved out of an examination of the traditional and current uses of these water bodies, as well as consideration given to future uses. The designations have also been developed to be compatible with the abutting landward land use categories. The classifications range from 1W, which represents a low intensity use of the water; through 3W, allowing for the storage vessels; and 4W, which would permit marinas and other pleasure craft associated activities; to 6W, the district that would be associated with industrial and cruise ship port activities.

In addition to the discuss of land uses, the plan calls for boat storage areas around Teague Bay, Knight Bay, and Cottongarden Bay, which has been designated as Intensity District 3W. The existing marina at Teague Bay has been designated as Intensity District 4W.

In Christiansted Harbor, the Gallows Bay area and the area immediately east of Protestant Cay (Hotel on the Cay) has been designated as Intensity District 3W, allowing for boat storage. The existing marina facilities at Gallows Bay have been designated as Intensity District 6W.

The docking facilities at Hess Oil Refinery and the Krause Lagoon Channel at VIALCO have been designated as Intensity District 6W, along with the Frederiksted Pier. The Frederiksted Harbor area

has, in fact, two water use designations. The Pier area itself, which has been rebuilt and improved, is designated as 6W to accommodate the cruise ship operations. The remainder of the Harbor is shown as 2W, which is intended for the use of the commercial fishermen in the area.

**PART III: ALTERNATIVE GROWTH
MANAGEMENT STRATEGIES**

Introduction

In communities throughout the United States, citizens, developers, and government officials are working together to foster creative development and protect sensitive land resources. The steps that the government must go through to achieve these goals are known as the growth management process.

A number of issues have been identified as problematic in territorial planning efforts. These issues described in the section, "What Do We Have?", may be addressed by a variety of growth management techniques which build upon traditional planning efforts.

The traditional elements in this process include:

- Planning, including the preparation of a Land and Water Use Plan, as well as specific functional elements such as housing, recreation, transportation, etc.
- Implementing regulations and strategies, such as land development laws, subdivision regulations, and land acquisition programs.
- Capital improvements planning and budgeting, and scheduling future investments in public infrastructure such as roadways, sanitary sewers, and potable water.

The growth management process normally involves the following tasks:

- A determination of goals, objectives, and strategies, as has been done through the "Guidelines for the Development of a Long-Range Comprehensive Plan for the United States Virgin Islands."
- An analysis of existing growth policies.
- An inventory of the available growth management tools and techniques.
- An analysis of which tools are best suited to local conditions.
- The adaptation of those tools and techniques that are considered appropriate for the Territory.
- The synthesizing of the selected tools into a system for managing growth.
- Continued monitoring of and refinements to the system over time.

In examining various growth management strategies, the underlying premise must be to adopt a system, in whatever form, that will preserve important natural and cultural resources and community distinctiveness while anticipating, planning for, and managing growth. The emphasis must be on protecting and enhancing assets and fostering quality development in appropriate areas.

This chapter examines some of the techniques that are being used in other localities, the results that have been achieved, and the applicability of these techniques to the U.S. Virgin Islands.

Growth Management is defined to include many specific techniques used singly or in combination, to influence or guide the amount, pace, type, density, location, costs, impacts, and quality of development.

The enormous pressures for growth and development in the Territory and the resulting effects on the landscape in the last decade have been overwhelming. The need for jobs, tax revenues, a more diversified economic base, mixes of housing opportunities, and the public's desire for detached homes and yards, is real and legitimate. Yet this creates an even more urgent need to find strategies that will enable the islands to grow in ways that enhance, not degrade, the qualities that give them distinction and character. In particular, the desire on the part of Virgin Islands residents to have their own home on their own lot will have to be reconciled with the fact that they live on small islands with ever-decreasing land resources, and that the land that is available has an ever-increasing price tag attached to it. Additionally, much of the vacant land is environmentally constrained. Creative approaches to land development must be found that offer reasonable housing opportunities without compromising environmental quality.

The past decades have brought significant improvements in the country's environmental quality. Yet, after all of this environmental action at every governmental level and by various citizens' action groups, serious degradation of the natural landscape continues. Distinctive buildings are being destroyed. Wetlands and other natural systems are being disrupted. Opportunities for solitude, for adventure, for quiet enjoyment of natural surroundings are fast disappearing. "Despite all our efforts," then Conservation Foundation President (and former Administrator of the U.S. Environmental Protection Agency) William K. Reilly, stated in testimony before the President's Commission on the American Outdoors, "...there is a steady, perceptible degradation of the countryside - an erosion of the distinctive qualities that differentiate one place from another. As they confront piecemeal urbanization, people all over the country are asking, 'How can we save our special places?' (The Conservation Foundation).

There is an urgent need to refocus efforts in growth management in seeking to achieve (or recapture) a better quality of life in the Territory that will build upon and reestablish distinctive and positive assets and character. Fortunately, there are developers, citizens, and Government officials who are working to protect critical, natural and historic resources and to foster development that enhances the positive qualities of the islands. But much more needs to be done to maintain what is distinctive about the Virgin Islands.

Communities that are held as ideal incorporate many elements (commercial vitality, jobs, good schools, a mix of housing types, adequate transportation systems) that go beyond environmental and aesthetic concerns. Nevertheless, how a place looks and feels, how it treats its heritage, says much about whether there is, in fact, a sense of community, a sense of caring by its citizenry about its future.

The key ingredient in establishing a higher quality of life is forging a vision of what the place can be. Concerned citizens must go beyond specific parcels and projects to developing an inspiring yet realistic vision, one that incorporates development and change, as well as the protection of community resources and character. Development will continue to occur. Citizen action may be able to shape its density, character, and cost. But such action cannot prevent change. The failure to accept this is what causes many people to regard all development as the enemy and makes it impossible to achieve a better community in light of the polarization and poorly designed sprawl that often ensues.

Developing and implementing a vision for a place are not easy tasks. It takes a compelling idea, persistence, consensus, influence, and many other difficult attributes. Every planning process attempts to set forth goals and objectives. But there is an all too familiar scenario that is played out where many well-intended plans have not ended up where they were supposed to. As Victoria Tschienkel, former Secretary of the Department of Environmental Regulation for the State of Florida, has said, "I think that we can probably take care of pollution-related problems in the State, but it's going to be tough. Even if we do that, I'm not sure that this is going to be a very nice place to live, because of the densities of the population and lack of a sense of community. Florida could end up as just one convenience store after another. If we can't come up with an image of what this State should be, we can protect the environment, but will be still be glad to live here?" (Ibid).

Several forces run counter to such broad thinking and action. Many people simply don't care. Landowners may focus their efforts only on the lots they own, developers only on the parcels they can develop, the neighborhood residents only on their immediate area.

Other people who do care, may not want any development or as little of it as possible. This works to define all development as pollution and often leads to polarization and little creativity in the way a community evolves.

There are, however, some ways to make the vision for the Territory come to life. Especially critical factors for successful initiatives are persistent local individuals and effective quality of life lobbies who spearhead land use conservation and planning efforts. Whether they be government officials, neighborhood activists, or business leaders, people with vision and tenacity are critical to making the islands better places in which to live. Individuals do make a difference.

Widespread interest in a land use issue is aroused typically in response to a particular controversial development proposal - e.g., Salt River on St. Croix, Smith Bay on St. Thomas, and Enighed Pond on St. John - and then it may evaporate as quickly as it was formed. Effective involvement in local growth management decision-making requires more. No matter what methods an individual or organization selects to promote a conservation or quality of life agenda, effective action requires a sustained presence. Without persistence, flexibility, vision, and some good humor, even the most sophisticated plans and innovative techniques will fall short of the mark.

A living community is not static. A place cannot be frozen in time. Historic Williamsburg, Virginia may be a wonderful place to visit, but one could not live here. Thus, as communities evolve, so too should efforts to ensure the success. Similarly, the ingredients that work to make a community an alive and thriving organism continually change in response to changing needs, opportunities, and circumstances. Successful communities continually experiment with a wide range of growth management techniques to retain distinctiveness and protect key natural and cultural assets.

By focusing on key assets and by building strong constituencies for protection and sensitive development control measures, special place, such as the Virgin Islands, can be sustained.

Growth Management Tools and Techniques

The effect of implementing growth management tools within a framework of continuously changing market conditions will create the need to reevaluate and modify the Land and Water Use Plan that, in turn, will lead to further refinements in the various growth management tools.

Specific Management Techniques

The preparation and adoption of the Land and Water Use Plan will be, in fact, only the beginning of the growth management process.

A large part of the problem in managing growth in the Territory over the last 25 years has been that good plans were prepared which had no implementing mechanism. Conversely, the Zoning Code that is the law of the land in the Virgin Islands (and has been since 1972) was not based on any comprehensive planning effort. A plan that captures the vision of the people as to how they want their community to grow, along with an effective land development law which provides the legal framework for implementing that plan, must be developed hand-in-hand.

Plans can be implemented only through land use regulations, capital improvements programs, and other strategies. These growth management techniques can be grouped into four basic categories:

- Land Use Regulations
- Public Spending and Taxing Policies
- Land Acquisition
- Private Voluntary Preservation and Protection Techniques

Although the techniques commonly appear as discrete options, most successful growth management programs combine several types of programs. Those communities that are successfully dealing with development pressures continually experiment with adapting various complementary strategies and techniques to meet their particular needs, which are constantly evolving. This is to say that, while the growth management program selected for the Territory may be without question the best one to be used now, it should be continuously reviewed for any refinements or wholesale changes that might have to be made because of a change of scenarios.

The following is a partial inventory of growth management techniques utilized in communities throughout the United States, and qualitative analyses of their applicability to address those issues which adversely impact on the quality of life for Virgin Islands residents. Analysis of these techniques is based on the following criteria:

Adequacy: the extent to which any given level of effectiveness satisfies the needs, values, or opportunities that gave rise to a problem.

Effectiveness: whether the given alternative results in the achievement of a valued outcome (effect) of action.

Equity: whether the effects and efforts, costs and benefits, are evenly distributed among different groups in society.

Political
Feasibility: the likelihood, given the existing and future potential disposition of public officials toward development, that an alternative will be supported by the appropriate policy makers.

Fiscal
Feasibility: the extent to which the given alternative impacts on a community's ability to provide services or generate revenues.

Sustain-
ability: the ability of the given alternative to maintain the recognized quality of life valued by the community.

Land Use Regulations

The authority for land use planning and regulation is derived from the police power that authorizes government to enact laws to protect the public health, safety, and general welfare. The most important regulatory techniques include zoning (in its numerous permutations), subdivision regulations, exactions, adequate public facilities ordinances and transfer of development rights.

ZONING

Zoning is the most commonly used device for regulating the use of land. Initially developed in the early twentieth century, primarily to insulate residential neighborhoods from the negative impacts of industrial development, the essence of the traditional zoning ordinance remains the physical separation of potentially incompatible land uses.

Conventional zoning promotes strict segregation of uses and dimensional and density requirements. From this orderly and static pattern, zoning has evolved into a system of numerous techniques designed to balance the predictability of conventional zoning with administrative flexibility, discretionary review of individual developments, and specialized techniques to meet particular local needs.

BONUS OR INCENTIVE ZONING - This technique allows a developer to

exceed the dimensional and/or density requirements of a zoning ordinance, if the developer agrees to fulfill certain specified conditions that would allow him to go beyond these requirements. Examples of this include when an ordinance or code authorizes a developer to exceed the height limitations by a certain amount in exchange for providing open space around the building, or when a developer may exceed the density requirements by a specified amount for a housing project if he agrees to "cluster" the units (see the discussion of cluster zoning below) and create usable recreation space with the surplus land.

In determining how much of a bonus might be awarded to a developer, consideration might be given as to the site where the development is proposed. If the bonus is granted, can the development and all of its associate function (e.g., parking, loading, etc.) be accommodated without being detrimental to the site? This is especially critical in considering bonus provisions for in-town areas such as Charlotte Amalie, Christiansted, and Cruz Bay, where land is in short supply.

Areas envisioned for residential development could allow for the building of homes on lots that are smaller than the zoning would normally allow. While there would be an allowance for a stipulated additional number of dwelling units, this would be compensated for by the provision of affordable housing, or the creation of open space that may be public or private ownership. The provision of affordable units or open space would have obvious advantages on all of the islands by potentially adding to the existing housing stock and/or recreational opportunities for the residents. However, on St. Thomas and St. John, topographic constraints are ubiquitous. Here, the clustering of homes on the more developable portions of a parcel may offer the developer and the Government more flexibility in dealing with storm water runoff and vegetation protection issues than if the area were to be developed in a more conventional manner.

The use of incentive zoning techniques can have an impact on many of the issues identified as concerns. The issue of affordable housing can be addressed by density bonus provisions. The density bonus can insure more units to be constructed on a site which may make the development more profitable as well as provide much needed affordable units. This provision may not be effective as a stand alone provision, but in connection with other provisions affordable units can be provided. The cluster provision, for instance, allows for smaller less costly lots. This can help to insure that the cost of infrastructure to service all the lots is reduced. Individuals will, therefore, be more able to afford housing. The ability for the incentive zoning provisions to create affordable housing opportunities sure provides for a sustainable environment for the residents of the Virgin Islands. The ability of these provisions to provide a legislative framework for a sustainable environment should be seen by policy makers

as positive tools for growth management.

For more information on cluster developments see the section below.

The Density Bonus and Cluster Development provisions are two growth management strategies that can be included in the Comprehensive Land and Water Use Plan's Virgin Islands Development Law. Both will serve to alleviate the Territory's identified issues of concern in an equitable fashion. And more so, the provisions will serve to guide development in a manner which is sustainable. For these reasons, the Incentive Zoning options have been selected as an appropriate growth management tool.

Overlay Zones - This zoning technique differs from conventional mapped zoning districts. An overlay zone applies a common set of regulations and standards to a designated area that may cut across several pre-existing conventional zoning districts. These regulations and standards apply in addition to those of the underlying zoning district. Two common examples of overlay zones are the flood zones established under the National Flood Insurance Program, and many historic districts.

- Flood zones are often described in zoning ordinances or codes, but are not shown on the zoning map. Rather, the zoning code provides that the flood district regulations apply to areas within the 100-year floodplain as designated in federal Flood Insurance Rate Maps (FIRM). An overlay flood zone may permit uses and densities allowed in the underlying zone, but impose additional construction and flood-proofing requirements.
- Overlay historic districts often allow the uses and densities permitted in the underlying zone, but require that structures within the district be built or maintained in conformance with regulations to ensure historic compatibility and integrity.

While floodplain zoning is the most common form of an overlay technique, and is certainly applicable to the Virgin Islands (especially St. Croix), there are other types of overlay zoning that should be considered. The most obvious one for the Territory would be one that regulates development on steep slopes. Virtually all of St. Thomas and St. John, as well as the northwest sector and eastern one-third of St. Croix has mountainous terrain conditions that must be protected. This is necessary to prevent adverse stormwater runoff situations that would result in siltation problems in the bays, harbors, and other shoreline areas that proliferate the islands.

It must be decided what percent of slopes upon which development

is proposed, should receive special attention, over and above any on-site stormwater retention/detention systems that may be required. This decision must be made in an island context, for it must be remembered that the Virgin Islands has been dealing with the problems of developing on steep slopes for generations. Where any land area containing more than a 10 percent slope might be a significant problem to a native Floridian, this condition would be looked at as developing reasonably flat land to a Virgin Islander.

Another type of overlay district that might be considered, especially on St. Croix, would be one that isolates lands containing the best soil conditions for agricultural crop production. The soil types can be easily established, using the official Soil Survey prepared by the Soil Conservation Service of the U.S. Department of Agriculture. If this type of overlay district is employed (as differentiated from the Agricultural Zoning mechanism discussed below), it will be necessary to establish if the positive soil conditions will mandate the type of development that can occur, or if the situation will be dealt with in a voluntary manner. That is to say, should the owner of a parcel of land that has a soil type which would result in high crop yields be restricted in how he/she may develop his/her land through regulatory measures, or should he/she be given an option to put (or keep) his/her land in agricultural production with some form of tax relief as an incentive? The answer to this question is dependent on how vigorously the Government wishes to pursue an agricultural development policy.

Agricultural Zoning - is a growth management technique used to preserve prime farm land. The preservation of agriculture land is linked to the conservation of this land use. The long-term use of land for agriculture is determined by the suitability of the soil and the use of productive soil conservation methods.

The purpose of agriculture zoning is to ensure the availability of land for agriculture production, discourage "urban sprawl," and to protect open space. There are two types of protection:

- The 'Right to Farm' provides that general farming operation can not be declared a nuisance.
- The protection of specific types of agricultural activity.

Agricultural zoning has a combination of limitation on permitted dwelling units along with the requirement of that dwelling site being related to soil type. Studies have found that the most effective zoning in balancing farming with development is one building lot per 25 acres or 50 acres, depending on the local average farm size. If the average farm size is under 150 acres, then the 25-acre standard is recommended. Two acres is the maximum lot size for non-agriculture building because the amenities associated with a large number of dwelling units will be incompatible with the preservation and conservation of prime

agriculture land.

In a rapidly urbanizing society, agricultural lands have a definite public value as open space. The discouragement of premature and unnecessary conversion of agricultural land to urban use is a matter of public interest and will be of benefit to urban dwellers themselves in that it will discourage discontinuous urban development patterns which unnecessarily increase the costs of community services to community residents.

Agricultural zoning makes agriculture the principal use of this district. In other districts, agriculture is often passed over by other uses for economic reason; however, the preservation of prime agricultural land for production is necessary to the conservation of adequate, healthful and nutritious food for future residents and neighbors.

Performance Based Zoning - is a growth management technique which sets development standards to eliminate problems. The problems might be managing highway capacities, protecting sensitive environmental areas, or the character of an area. Consistent and uniform zoning standards along with good design can provide all the protection needed, and address any problems that different types of uses pose (*Kendig, 1989*).

The original performance zoning ordinance was developed in 1973 for the purpose of providing a wider range of housing types, protecting the environment, and improving subdivision design which current development problems the U.S. Virgin Islands face today.

Housing experts have identified conventional zoning, separation of land uses and minimum lot size requirements as contributing factors to the provision of affordable housing. Research has shown that due to the scarcity of land zoned for residential development, it often leads to an increase in the price of land. In contrast, performance zoning places more emphasis on the surrounding of a site and design standards. Consequently, "by right" property owners have a wide variety of uses flexibility in developing a site. Rather than looking for a site that is zoned, and may not be necessarily adequate for the development, developers look at how the development of the site could satisfy performance standards.

Cluster housing, mixing of single and multi-family units, and higher density have reduced the energy needed in each housing unit. Clustering also reduces the cost of housing by expanding services rather than extending services.

The altering of drainage often time is expensive because water is directed to neighboring properties and public roads. Performance standards providing protection of natural drainage systems eliminate the need to finance the development of expensive storm

sewers. It also protects water tables which are replenished by natural drainage.

Traffic issues can be addressed by curb cut standards for uses. Encouraging mixed use developments can alleviate traffic problems by shortening some trips and eliminating others from the arterial network.

Each site that is considered for development is assessed and a portion of it designated as undevelopable. The intensity of use and unattractive sites can be controlled with landscaping ratios and floor area ratios, screening and other requirements.

Inconsistent and unpredictable development is damaging to residents, the environment, and public service levels. The current system is discretionary, it may approve a housing development and disapprove another similar development for political reasons. Finally, performance zoning promotes consistent and uniform development.

Cluster Development Zoning - is a land use control device that allows flexible design and clustering of development at higher densities on the most appropriate portion of a parcel to provide increased open space elsewhere on the parcel. This technique has become increasingly popular as more communities realize that conventional zoning and subdivision regulations often result in projects characterized by low-density sprawl with no intervening open space. Clustering can offer several benefits relative to conventional zoning, including:

1. Limiting encroachment of development in and adjacent to environmentally sensitive areas.
2. Reducing the amount of open land disturbed by development, thereby encouraging the preservation of agricultural lands, woodlands, and open landscapes.
3. Reducing the amount of roads and utility lines that would have to be installed (and maintained), which could reduce the cost to housing and public services.

Cluster development techniques typically do not allow increased overall development density (except as may be specially allowed and as was discussed in the Incentive Zoning section above). They simply rearrange development to preserve open land and improve site design. The concept can be demonstrated by a simple example of cluster development: a developer has 25 acres in an area zoned for half acre lots, which could be built out with approximately 50 lots, using the entire 25 acres. Under a clustering provision in the zoning code, the developer could cluster the 50 homesites on 12 to 13 acres, for example, and permanently dedicate the remaining 12 to 13 acres of open space for public use.

The cluster development technique is a means of addressing the affordable housing issue. While allowing developers, or individuals, the right to build on smaller lots may not be the most effective measure in providing affordable housing the technique allows everyone to purchase and/or develop on smaller less costly lots. The cost of not only the land will be reduced but the infrastructure costs for servicing the plots can be minimized. The issues of political feasibility and sustainability should go hand in hand. The cluster development technique will provide for long term cost reduction as the maintenance costs will be lower, and the cost of land, if all things stay the same, should be reduced due to the smaller lot sizes. These factors should play a role in the policy makers thinking and they will most likely realize that the cluster provision is a sound policy decision.

Cluster development provisions can also serve as a tool in improving the management of the impacts of growth on the environment. To the degree that developers utilize these provisions they will be effective measures to insure that the impacts are limited to a smaller portion of the site than with conventional standards. This will allow all of the residents and visitors of the Virgin Islands to enjoy more serene landscapes as the open space will be preserved and scarification of hill sides can be reduced.

The preservation of open space will also allow for the preservation of habitat areas for many of the wildlife species that inhabit our islands. As the common areas will be maintained in perpetuity, these developments will serve to slow down the rate of destruction of these habitats. Also the common areas which are developed as tot lots, walking trails, gardens, etc. will provide for much needed outdoor recreation areas.

The same can be said for the preservation of agricultural areas. Over time the Virgin Islands has been losing agriculturally suitable areas to housing and commercial development. The Cluster Development provision can help to maintain the prime suited soil for later generations who may find the need to once again grow their own food. This is important as more and more nations are seeking the economic where-with-all to compete in the world economy. The Virgin Islands can maintain more of this prime farm land through provisions which allow for smaller lots and open space preservation. This "open space" can be used as community gardens or even turned into orange, or grapefruit groves, which can help to provide the residents with less expensive agricultural products.

Overall, the Cluster Development provision is an adequate and effective tool for helping to alleviate the Territory's identified issues of concern. There is undoubtable equity as the costs and

benefits will be shared by all those in the Territory. Most of all the provision provides for a sustainable future. And as this growth management technique is straight forward, and the utilization of the provision is, in most cases is optional, a politically feasible option.

SUBDIVISION REGULATIONS

A subdivision is a growth management strategy for controlling the conversion of larger tracts of raw land into smaller tracts for sale, lease, or development.

Subdivision controls emanated out of the need to address the separation of larger tracts of land into smaller tracts of land for ownership transfer or development opportunities. Early subdivision laws were very rudimentary and were developed as a means of platting land for better identification of property ownership. At that time, there were many conveyance problems and the subdivision system was an attempt to remedy those problems.

Eventually a block and lot system was created which made it much easier for the conveyance. Official recording of these transactions soon evolved.

Soon it also became clear that the subdivision control process would accomplish other substantive objectives. As it evolved, subdivisions provided for proper design, proper layout of streets and facilities. Prior to this, those elements either did not exist or were done in a very poor manner.

During the early nineteenth century, many subdivision regulations required subdivision streets to conform to the municipal street system plan. After the Standard State Planning Enabling Act was completed in the 1920's, many of the early subdivision language of that period was integrated into the Enabling Act.

Much of the early language in subdivision regulations made it clear that it was intended that a large measure of public control be placed over this process in order to meet a certain level of standard:

Section 13 of the Standard State Planning Enabling Acts states:
"Whenever a planning commission shall have adopted a major street plan [which is on file on plat of a subdivision of ... shall be filed or recorded until it shall have been approved by such planning commission..."

Section 14 of the Act states:
"Before exercising: ... [subdivision control] process ... the planning commission shall adopt regulations governing the subdivision of land within its jurisdiction. Such regulations may

provide for the proper arrangement of streets in relation to other existing or planned streets and to the master plan, for adequate and convenient open spaces for traffic, utilities, access of fire fighting apparatus, recreation, light and air, and for the avoidance of congestion of population, including minimum width and areas of lots."

More recently, new subdivision regulations have provided greater control on development which shape the character of environmentally sensitive areas and require a greater amount of on-site facilities. Additionally, new subdivision regulations require that land is dedicated for public facilities, parks and schools.

The Subdivision Laws of the Virgin Islands have played a major role in the development of the Territory and is now a main stay of the development process. Currently, the Department of Planning and Natural Resources has a draft Subdivision Regulations which is intended to be integrated into the Proposed Virgin Islands Development Laws.

If the Subdivision Laws of the Virgin Islands are continued, there will probably be three areas that will be considered for amendments in order to address growing community needs and concerns:

1. Requiring that certain level of subdivisions be considered as major permits;
2. Requiring that greater amount of land be dedicated for public facilities;
3. Attaching some kind of impact assessment to permitted subdivision;

Subdivisions represent a main stay in most growth management schemes and it is clearly an important element of the Virgin Islands growth management approach.

It is strongly recommended that the subdivision process be included as one of the elements in the growth management package.

ADEQUATE PUBLIC FACILITIES SYSTEMS

An adequate public facilities (APF) system is a growth management technique which permits a community to determine the location, timing and public cost of accommodating new development. This is accomplished by requiring that a new development demonstrate not only compliance with appropriate zoning, building and subdivision laws, but also that public facilities and services will be available, with sufficient capacity to accommodate the proposed development at the time that it comes on line.

The most common public facilities which impact on development decisions in these systems are potable water, sanitary sewer and roads. Other facilities and services which are utilized in the development approval process in adequate public facilities systems include stormwater management facilities, park and recreational facilities, and emergency response time.

Adequate public facilities systems establish quantitative standards for public facilities and services (such as sewage treatment and police protection) and link development approval to the ability of the facility or service to support the proposed development while maintaining or exceeding the established standard.

In order for an adequate public facilities system to be established, there must be enabling legislation specifically authorizing the municipality to do so; there must be a comprehensive analysis and quantification of existing levels of service for relevant public facilities and services; levels of service which are achievable and protective of the public health, safety and welfare must be established; and the system must be coordinated with a capital improvements program.

The implementation of an adequate public facilities system can range from very simplistic to overly complex, depending on the number of service areas defined and the number of standards applied in the development review process.

Within the context of the United States Virgin Islands, an adequate public facilities system would best address the stated issues of (1) unsatisfactory potable water and sanitary sewer services (2) insufficient transportation facilities; (3) insufficient public facilities and services; and (4) the improper management of the impacts of growth and development on the environment.

The implementation of an adequate public facilities system in the Territory is one which can effectively and adequately speak to the four above issues. By ensuring that adequate capacity is available in the relevant public facilities and services that support development, APF systems can ensure that growth does not outstrip the Territory's capabilities to provide potable water, sanitary sewer, roads and other public facilities and services, and that any adverse public safety and health impacts are appropriately mitigated.

The inherent equity of an APF system is one of its strengths. By linking development approval to the provision of a specified level of facilities or services, which are programmed through a community's capital improvements plan, everyone shares

proportionately in both the cost and benefits of the system. Implementation in the Territory would be hampered, however, by the absence of the CIP process.

Adequate public facilities systems have also been demonstrated in a number of communities as being a key component in maintaining a desired quality of life. The measure of that quality is the level of service (LOS) standards established for each of the public facilities and services that support development. The system's function of disallowing development which erodes the quality of life ensures its sustainability. The establishment of a viable APF system in the Virgin Islands is further limited, though, by the absence of those legislatively-adopted quantitative measures of the Territory's quality of life.

The two most limiting criteria in assessing the potential viability of an APF system in the Virgin Islands are the fiscal and political feasibility thereof. In a community which has a high or moderate level of public facilities and services provision and ongoing capital improvements planning and programming, APF systems can be very successful. In the Virgin Islands, where public service deficiencies are normal, the establishment of adequate levels of service standards would: (1) lead to a de-facto moratorium on various types of development in numerous areas on each island; and (2) require that the Territory devote significant time and sums of money to correct existing deficiencies. Not only would the cost of establishing an APF system in the Virgin Islands at this time be fiscally imprudent, it is also questionable that the political will exists to establish such a program which conditions development approval on the infrastructure's capacity to assimilate it.

For the above mentioned reasons, the establishment of an adequate public facilities system in the Virgin Islands is not recommended.

CAPITAL IMPROVEMENT PROGRAMMING

Capital Improvement Programming is the long range scheduling of projects to meet the growth and development needs of a community by estimating the cost of these projects over a five to ten years period.

With complexity of both financing and development activities, even the smallest community needs to carefully analyze the way it program funds for various improvements to be sure that it stretches its dollars as far as possible.

Capital Improvement Programming began in earnest at the local level during the 1930's when local concern with public works was high and, the federal government was trying to stimulate planning activities.

During the early 60's a committee within the American Planning Association (APA) issued a report which called for a financial plan as part of an areas Comprehensive Plan. The APA also proposed that for every Comprehensive Plan there should be a capital needs list intended as a comprehensive listing of all capital improvement recommendations contained in the comprehensive plan. The report stated that a "more important aspect of the capital program, is that it presents the opportunity to schedule projects over time so that the various steps in the development of an area logically follow one another. It gives an advance picture of future needs and development activities."

One of the greatest difficulties in capital improvement programming is trying to decide which projects are priorities and establish who or how those priorities are decided. This process is usually solved based on a community's development and political structures and practices, and its existing policies. The decision making process, whatever it is, should be spelled out in the capital program in order to establish and make it clear how decisions were or will be made.

Typical terms used under capital improvement programming include:

1) Capital Improvement

Any major non-recurring expenditure or any expenditure for physical facilities or government, such as cost for acquisition of land or interest in land; construction of buildings or other structures; construction of highways and utilities lines; fix equipment; landscaping and similar expenditure.

2) Capital Improvement Program

The long range schedule of projects with their estimated cost over a five to ten year period. The most common period being six years.

3) Capital Improvement Budget

The list of projects together with amounts and sources of funds for the coming fiscal year.

The process of capital improvement programming typically require the following step:

- 1) An inventory of potential projects, including cost estimates and an initial evaluation of their relative priorities;
- 2) an analysis of these projects requests usually involving

- discussion with the sponsor;
- 3) an investigation of the financing capabilities of the community and the relation of these to different project categories;
 - 4) a schedule of project execution in a long range program list which considers project-relationships to each other and to financial requirements;
 - 5) selection from this schedule of a slate of projects for early action. This generally, takes the form of the capital budget for the coming fiscal year;
 - 6) formal adoption of capital budget against the background of the long-range recommended program usually after some form of public review.

The territory of the United States Virgin Islands has not utilized Capital Improvement Programming in its classical sense. The Territory has always played catch up in providing infrastructure and services in order to maintain an adequate level of service. For the most part, the Territory has not kept pace with the needs of the residents of the Territory resulting in a standard below what the community expects.

Over the years, capital programming has been done on a project by project basis with prioritization of these projects being established at the highest levels of government, but without a formula for prioritization nor a comprehensive plan to tie it to. These decisions were based primarily on political considerations. Most attempts to institute capital programming have been stymied by a lack of data and lack of cooperation by agencies that have the limited available data.

Consequently, a capital program does not exist in the Territory. The Territory does have a list of long standing capital projects that continue to change in priority, order, and funding sources.

Traditionally, a capital improvement program would have to comply with a comprehensive plan and, would allow for the growth of infrastructure and services consistent with the Comprehensive Land and Water Use Plan.

Capital Improvement Programming is an essential element of the Comprehensive Land and Water Use Plan and would likely strengthen the planning process in the Territory. I strongly recommend that this element be included in the Territory's growth management package.

Public Spending and Taxing Policies

Although not traditionally viewed as methods of managing development, public expenditure and property taxation policies may have significant impacts on land use. Public facilities such as roads, water, sewer, and public transportation can especially influence the level and characteristics of development in a community. A growth management strategy is incomplete unless it accounts for these influences.

IMPACT TAXES

An impact tax is a growth management mechanism utilized for the generation of revenues that is levied under the "**taxing powers**" of a community. The revenues that are generated via this mechanism can be used for any general fund purpose. The collection of these revenues could be enforced through means other than denial of the right to develop, build, or occupy a structure. A specific example of enforcing this revenue collection would be via liens on properties, which can be imposed at anytime, including during the development process. (Snyder and Stegman, 1986, pgs. 60 and 106).

Taxes require explicit authorization under enabling legislation in most states and because most states have not passed such authorization, this growth management technique has not been readily adopted. Two states (California and Colorado) have adopted and upheld the incorporation of this growth management technique whereby the revenues are generated via "**development fees.**"

The Territory is experiencing a severe fiscal deficit. Although this problem is not entirely directly related to development, the implementation of this mechanism could help to lessen the fiscal woes. As stated in the definition above, impact taxes are not directly tied to development approval and are not bound by any rational nexus. A rational nexus is the formal establishment of the reasonable relationship between charges and costs for improvements. Thereby, affording the Territory the facile opportunity to generate revenues. The revenues generated are not required to be earmarked to any specific fund. Thereby, providing a revenue mechanism which could be applied towards the mitigation of any development problems facing the Territory. For example, capital improvements and the associated operational expenses could have a funding source through this mechanism. The Territory could have the resources to purchase real estate, thereby instituting a protective mechanism for environmentally and agriculturally suitable sites. Revenues of this nature could also be applied to address the lack of affordable housing, as well as the inadequate infrastructure and mass transit transportation facilities. The most efficient use of the revenues generated would be the dedication of the revenues to a specific programs. Examples of specific programs where these revenues could be applied could be affordable housing, recreational and park facilities.

With the imposition of impact taxes, there would be equal protection for all sectors of the community, all would contribute and all would benefit from the uses of these revenues. The use of these generated funds could also serve as a economic stimulus among the private sectors of the Territory. As more taxes are generated, one could assume more problem areas can be addressed.

The major legal limitation of impact taxes is they cannot be imposed as a condition of subdivision or development approval. This issue in particular along with any others which may arise as a result of drafting the appropriate legislation for the Territory could be resolved by the legal minds at that time.

Overall, impact taxes would serve a beneficial need if incorporated as a growth management mechanism in the form of providing a consistent reliable funding source to the Territory independent of any other outside funding sources.

PREFERENTIAL ASSESSMENT

Preferential assessment or Use-Value Assessment Taxation is a system of taxation where the value of a parcel of property is assessed based on its current use or income producing capacity, rather than the usual market assessment which takes the property's zoning, development potential, and sale price for similar parcels, in the determination of the parcel's value.

Numerous jurisdictions have utilized preferential assessment for farmland, and some have utilized limited assessment programs for open space, forest lands, and land of historical, scenic, and ecological importance.

Preferential assessment can reduce the tax burden on lands with development pressures, as well as lands which cannot or should not be developed. By tying the value of the land to only its use, or the income it produces, preferential assessments allow tax bills to be at a level which affords a property owner a reasonable return for the property, while at the same time encouraging the property owner to continue the agricultural or low intensity use of the property.

Preferential assessments are established by statutes enacted by local legislators. Generally, under preferential assessment programs, property owners can dedicate their properties for agricultural or low intensity uses for a five, ten, or twenty year period, with provision of rollback taxes and a certain percent penalty for premature withdrawal of land from the program.

By themselves preferential assessments have not been totally successful in having land retained for agricultural or low intensity uses; they have often become speculators' haven; and

they have at times created tax losses for jurisdictions.

For preferential assessments to be successful as a growth management technique, they must be tied to a comprehensive growth management plan, and the penalty imposed for withdrawal out of the program should be substantial enough to deter such withdrawal.

The U.S. Virgin Islands has in effect a preferential assessment program where property owners who dedicate their property for agricultural or horticultural uses are granted a 95 percent property exemption, with provision for roll back taxes of two years if the use is changed to non-agricultural.

Preferential assessment could be adequate in addressing local growth management issues of loss of agriculturally suitable lands, loss or degradation of habitat areas, degradation of groundwater resources, improper management of areas of particular concern, and loss of open space. By itself, preferential assessment does not effectively address the issues mentioned above, however, in conjunction with a land use plan it would provide incentives to stimulate uses consistent with growth management goals.

The political feasibility of preferential assessment in the Virgin Islands is evidenced by its existence, and its continuation is recommended if an agricultural component is to be part of a diversified economic program. It is suggested, however, that the law which authorizes the existing preferential assessment program be amended to allow the linking of preferential assessments to not only the use of land, but to its size and income generated. The latter would hopefully prevent or minimize the revenue losses the V.I. Government experiences as a result of land speculation. Further, it is recommended that the rollback taxes for persons who withdraw from the program be increased to five (5) years.

SPECIAL ASSESSMENTS

Special assessment is well known land management technique that is utilized for the financing of public improvements. Through this technique, a municipality can levy a charge on property owners in order to defray all or part of the cost of a specific public improvement within a designated area that is benefitted by the improvement. The public improvement often affects the enhancement of the value of assessed property.

Special assessments are utilized most frequently to finance storm drainage systems, sanitary sewers, street paving, curbs, sidewalks, water lines, recreational facilities, street lighting, off-street parking, under-ground utilities and various other local improvements, i.e., reconstruction of deteriorated sub-standard and outdated facilities in older and newer developments.

A municipality's authority to levy assessments for public

improvements comes from either statutes, charters or home rule provisions. The public improvement for which property owners are levied a charge must be an improvement authorized by the municipality. The assessment or charge to each property owner is apportioned according to the estimated benefit that will be accrued to each property owner. What may also be considered in the assessment to each property owner, are lot size, current property valuation, and distance from existing public systems.

The initiation of public improvement projects which are to be financed by special assessment is typically by either the petition of property owners, resolution of a local governing body, or by an administrative recommendation which is followed by a resolution of the governing body.

In the U.S. Virgin Islands, special assessments could adequately and effectively address the issues of unsatisfactory potable water and sanitary sewer, and insufficient public facilities.

As the Virgin Islands government embarks on programs to improve as well as to expand infrastructure in certain areas, special assessments could be a viable means of generating revenues to assist in the payment of the improvements. Additionally, when developments occur which are not consistent with the official land use plan or policies of the V.I., and resultantly occur in areas of limited or no public facilities and services, special assessments if property designed could be an ideal mechanism for reducing the aggregate public facility costs of V.I. government by shifting the costs of the improvement to the developer and property owners.

Special assessments are tantamount to user fees, and if they are to be implemented in the USVI, there must be an equitable means of determining the proportional share that each property owner who benefits from the improvement will have to bear. Various formulas exist for apportioning the costs of improvement according to benefits received. The frontage method has been recommended since it appears to be the fairest and simplest. This method "assesses each parcel of land abutting an improvement in the proportion that the lineal feet of the land abutting the improvement has to the total frontage along the improvement." A service unit method may also have to be utilized, where assessments would be also based on lot or service unit. (Bureau of Governmental Research and Service, and the League of Oregon Cities Association of Oregon Counties, 1982, p. 24) .

Special assessment would be fiscally feasible since it would provide the V.I. government with a viable means of generating revenues to finance public improvements. Politically though, its feasibility is uncertain since it may be perceived by legislators as a "costs" burden for property owners, and arbitrary in its method of apportioning cost to them.

In addition to allowing government to recoup some or all of the cost of public facilities and services, special assessments could be utilized as a disincentive to development in areas not designated for intensive land uses. A note of caution should be interjected though, since it can be reasonably assumed that some infrastructural improvements that would be the subject of any type of special assessment would be either at urban fringes or in areas along the major affordable housing developments, and it is recommended that a policy be implemented which would exempt in part of whole fees on infrastructural improvement of affordable housing, in order that the fees do not contravene the provision of affordable housing in the territory.

In conclusion, special assessment as a land use management technique should be explored for utilization in the territory.

References: Bureau of Governmental Research and Service and League of Oregon Cities, Financing Local Improvements By Special Assessments, 1982.

IMPROVEMENT DISTRICTS

Special improvement districts have been created in many forms to raise revenues for roadway improvements or other public improvements within a defined geographic area. These districts in many areas are established to generate renewed confidence in undeveloped or economically depressed areas. Additionally, improvement districts play a most important role by providing the necessary mechanism to encourage proper planning, design, and implementation of community and local improvement programs in these designated neighborhoods. Landowners within the improvement districts are levied a special assessment which is used to service public facilities and infrastructure that will benefit their own communities, (e.g., roads, sidewalks, utilities, on-street and off-street lighting, storm sewerage and drainage systems, sanitary sewer lines, potable water lines, parking lots, transportation, recreational parks and open spaces, and schools, etc.).

A mechanism that is being used increasingly by American communities is known as tax increment financing (TIF). The basic tenet of TIF is that redeveloped property will increase in value and generate higher property tax revenues than if nothing were done to rehabilitate property and/or structures. It is most commonly used in downtown areas so that if it were to be used in the Territory, it would probably be employed in Charlotte Amalie, Cruz Bay, Christiansted, or Frederiksted. The increase (or increment) in the tax revenues over the assessed value prior to the improvements would be "captured" and pledged to pay off the bonds that were issued to finance the redevelopment. Once the project has been paid off, the increment may be channeled back to a redevelopment fund or assimilated into the general revenue fund. This technique has proven to be an effective means for encouraging and facilitating needed downtown redevelopment and revitalization.

How the process might work in the Virgin Islands is explained in the following example. If it were determined that a parking garage is necessary to improve the functioning of downtown Christiansted or Charlotte Amalie, a redevelopment district would be established for the area that would be primarily affected by such an improvement. The redevelopment district with its precisely drawn boundaries must first have a detailed plan prepared for the area. There must then be a declaration of substandard conditions in the area that will lead to the establishment of the TIF District. Once this is done, the tax rate is frozen within the TIF until the improvements that have been identified in the redevelopment plan have been accomplished, including the building of the parking garage. At this point, the tax freeze is lifted and the increase in tax revenues are used to pay off the bond that was issued to pay for the improvements within the TIF District.

The creation of special improvement districts are authorized and empowered through local legislation. The districts, established in the forms of public corporations or authorities, are approved, established, administered, monitored, and regulated, in many jurisdictions by local government agencies or departments so designated by legislation. The improvement districts are governed by community elected, nonpartisan board members and may be staffed depending on the size and objectives of the districts. Community projects and improvement programs, which must be consistent with a Comprehensive Land and Water Use Plan, are determined by the districts boards based the agreed upon current levels of public services as well as the desired levels of services. Consequently, the improvement district boards are responsible to the district property owners they represent.

Special improvement districts, such as the one established in Oak Park, Chicago in 1973, are growth management and economic development tools which allow local communities to offer and provide special services and improvements which may not otherwise be available throughout the Territory. The property owners who ultimately and in most instances singly benefit from these improvements are the ones who fund them.

Land Acquisition

Governments enjoy broad authority to acquire real property interests, either through voluntary sale or condemnation, or any legitimate public purpose. Land acquisition is an important supplement to land-use regulations as a means of managing growth and protecting critical resources. Although communities generally use land acquisition to directly control the use of the specific parcel acquired, several places have used this technique to influence growth management policies. Boulder, Colorado, for example, has used the proceeds of local bond issues and a local

sales tax to acquire a large amount of land in the foothills of the Rocky Mountains and farming districts surrounding the City to prevent environmentally distinctive and fiscally unsound development (from the City's standpoint) of these areas.

Land acquisition programs are normally funded by property, sales, or real estate transfer taxes. Bond issues backed by one of these taxes are commonly used. Nantucket Island, Massachusetts, and Block Island, Rhode Island, for example, impose a two percent conveyance tax on most real estate transfers to fund open-space acquisition programs.

FEE SIMPLE ACQUISITION

Fee Simple Acquisition is a growth management technique used by government to gain absolute title and rights to land, without limitation or condition, for the full public use and purpose of the government.

This growth management technique is commonly used when the public requires full use (or purpose or benefit) of a property. Over the years, clear meaning of the terms "public use, purpose, and benefits" have been challenged. Consequently, interpreting the definition of the terms had been considered a judicial function and is, therefore, determined by the courts. For this reason, government land acquisition should be guided by and consistent with a land use plan which identifies and defines those public uses as required by any given community or jurisdiction.

Properties which would be acquired by the government must be appropriate and relevant to the authorized purposes and operatives of the local government. The authorization to acquire properties in fee simple must be "empowered" through local legislation. Consequently, local governments usually acquire and manage properties permitting them to achieve stated goals and objectives which would provide quality living opportunities for its residents.

Publicly acquired and managed properties are subsequently redeveloped or held in trust for future community and economic development, conservation, or preservation. For example, properties are acquired to provide such uses as public facilities, i.e., to construct fire stations, schools, hospitals, parks, housing, etc. Recently, however, many jurisdictions have acquired land for less traditional uses such as expanding or providing public access, as well as for the conservation and preservation of greenbelt areas, open spaces and scenic tracts, and environmentally sensitive areas.

Public acquisition of properties effectively addresses the insufficient volume of affordable housing and community development by making available lands suitable for the

construction of homes and communities.

The high cost of land significantly contribute to the high price of developing housing. Ensuingly then, when addressing the issue of providing affordable housing for low and moderate-income residents, this growth management technique is deemed adequate, effective, and equitable. The development of affordable housing for low and moderate-income residents is made possible when local governments identify and map lands within the inventory of publicly owned real properties, which are suitable for residential uses, and then make those lands available to private residential developers at a cost that is less than market rates. This process pivotally reduces the price of developing housing. Fee-simple acquisition, thus, encourages the provision of safe and sanitary housing to those segments of the population who have been priced out of the housing markets, rentals as well as ownership, and who would not otherwise be able to afford a "quality" living environment.

In addition, as a growth management tool, fee-simple acquisition permits the local government greater accessibility and management of lands as well as economically viable uses which may not otherwise be prioritized in the hands of private owners. This technique provides local government with the necessary mechanism for the effective plan implementation and monitoring of its stated land use policies and objectives. For example, on the island of St. Croix in 1975 there were approximately 17,216 acres of land in farm operation. A substantial amount of these farm lands are in private ownership as could be expected. Over the past 20 years farm lands have been reduced significantly due to rezoning for intensive residential as well as commercial uses. This reduction in farm lands has been recognized by the Office of Economic Develop as a leading factor in the demise of agriculture as a viable industry in the Territory, and therefore, drastically diminishes the propensity for economic self sufficiency.

On the hand, where environmentally sensitive areas in the Virgin Islands were being rapidly developed and overdeveloped causing severe negative impact on our land and water, federal and local legislation which serve as an additional layer of protection have been successful in reducing the adverse effect caused by the uncontrolled development.

In order to foster and insure the protection and management of open spaces, environmentally sensitive areas, and agriculturally suitable lands, the federal as well as several state and local governments specifically authorize this growth management technique. Legislations provide for the acquisition of properties for the purposes of conservation and preservation of open space in order to enhance the social, cultural and economical environments and, therefore, sustain a higher quality of life for the future.

The Fee Simple Land Acquisition technique as implemented in the Territory has been a viable source of revenue, as well as an economic stimulator to our treasury. Over a period of time public landholdings have ensured local programs which:

- Provides a cheaper, more steady supply of land for the development and construction industries;
- Creates more home ownership opportunities which in turn increases the Territory's tax base
- Ensures the long-range economic growth, stability and self sufficiency of the Territory

ACQUISITION OF EASEMENTS

The acquisition of easements constitutes a particularly useful tool for government and land trusts. Easements are effective devices for preserving environmentally sensitive lands, providing public access along greenways, and allowing landowners to obtain income, estate, and property tax benefits for land stewardship while they continue to live on their land.

Easements are among the distinct property rights that may be sold separately from the other rights (in other words, "separated from the fee"). Easements can be divided into two categories: affirmative or negative. The owner of an affirmative easement has the right to do something with or on property belonging to someone else. An affirmative easement, for instance, may authorize a utility company to place electric lines across an individuals' property or may allow the public to pass over property to get to a beach area.

The owner of a negative easement has the right to prohibit certain activities on property owned by someone else. A negative easement may prevent a landowner from constructing a building that would interfere with a scenic view from a neighboring parcel. This type of easement may provide many of the same public open space benefits as full fee simple acquisition, but can generally be acquired at a substantially lower cost. Additionally, management costs are usually assumed to a large degree by the private landowner, rather than the government or land trust that owns the easement. Another fiscal advantage of easements is that the land stays on the tax rolls. Negative easements, however, have the potential to create long-term administrative, enforcement, and maintenance costs.

There are many affirmative easements throughout the Territory today. The majority of these are associated with utility lines or stormwater management needs. In the future, it is anticipated that the practice of establishing easements for power lines and sewer and/or water lines will continue.

To ensure that appropriate stormwater runoff issues are properly and adequately addressed, the Government should look at acquiring

easements in the major guts on all of the islands. This would provide the best insurance against any construction activity taking place in locations that should be preserved to allow for the natural flow of stormwater. It would also permit the Department of Public Works to set up a regular, ongoing maintenance program to keep these guts and drainageways free of debris.

No program of negative easements is proposed or contemplated in the Territory.

Private Voluntary Land Protection Techniques

Land acquisition and conservation techniques available to governments or private nonprofit organizations can provide an important complement to regulatory and public spending measures. A public or private land trust can use a range of acquisition and conservation techniques, singly or in combination, to meet local conservation and growth management objectives. In areas such as Nantucket Island, Massachusetts; Block Island, Rhode Island; and Davis, California; communities have established local land trusts as governmental or quasi-government entities. These land trusts participate in the private real estate market as representatives of the public interest and use the range of voluntary land conservation techniques available to private land trusts.

The two most important private land protection techniques used by land trusts to protect land or historic buildings are fee simple acquisition and acquisition of easements. There are also many other private voluntary land protection tools to consider. A common factor in these tools is that they provide land trusts a means to control or influence the use of valuable parcels with limited expenditures of money. These tools include:

1. Donation or bargain sale of fee simple interest, conservation easements, or other less-than-fee simple interests in the land
2. Options to buy
3. Rights of first refusal
4. Leases and management agreements
5. Pre-acquisition
6. Limited or controlled development
7. Conservation investment.

DONATION OR BARGAIN SALE

Land trusts often acquire property through donation or bargain sale. Full-value purchase is rarely the approach of first preference because of the expense of acquisition and management. Donation, when available, is the choice for obvious reasons. Donation also offers the conservation-minded landowner the greatest potential tax benefits.

Between full-value purchase and donation lies the bargain sale approach. A bargain sale involves a combination of donation and purchase, in which a landowner transfer property at a price below fair market value. The landowner may thus obtain tax benefits as well as direct cash payment.

OPTIONS

An option is a widely used real estate contract device that provides a party with a temporary right - but not obligation - to purchase property at a specified price within a specified time. The party is not obliged to purchase the land; however, is prevented from accepting offers from other potential purchasers during the time of the option. Options can generally be acquired at a fraction of the ultimate purchase price, or they may be donated by the landowner. The deadline imposed by an option may be useful to a land trust in marshaling the funds necessary to purchase the parcel. The land trust can purchase the property during the option period; if not, the option interest expires.

RIGHTS OF FIRST REFUSAL

A right of first refusal is an agreement between a landowner and a second party in which the owner of the property agrees that if he or she receives a legitimate offer from a third party to buy the property, the second party will be notified and given a specified period of time in which to match the third's party's offer. Land trusts can acquire such rights by purchase or donation to tie up a parcel without having to buy it immediately. Although both an option and a right of first refusal can be donated, the land trust's legal position will be improved if the interest is crated in a written contact, a minimal amount of money is paid for the contract interest, and the contract is recorded in proper form.

LEASES AND MANAGEMENT AGREEMENTS

These tools provide a land trust with temporary control or influence over a parcel without the expense of acquisition. They are flexible instruments that can be drafted to implement any number of desired relationships between a property owner and a land trust. Leases generally give a land trust the right to manage and occupy property for a certain time, while management agreements specify the terms and restrictions under which the property owner continues to manage the property.

PRE-ACQUISITION

Land trusts may acquire property to hold and management in perpetuity. They may also serve as an intermediary for a public land management agency. A public agency may wish to work with a private land trust for pre-acquisition because the private entity

can often negotiate for acquisition faster and more adeptly than the public agency. After land is acquired by a land trust and turned over, public land management agencies can often manage additional adjacent land more economically than can a private trust. Ownership by a public agency also confers more protection against condemnation by other public agencies than does private land trust ownership.

LIMITED OR CONTROLLED DEVELOPMENT

This technique typically entails clustered development or other limited development of a portion of a parcel to finance acquisition and preservation of the remainder of the property. Limited development can permit land stewardship and substantial resource protection in situations where donation is not possible and acquisition is not financially feasible.

This tool often lends itself to the formation of a partnership between the trust and a property owner. In such partnerships, the latter provides the land while the former provides the planning and land protection expertise, community goodwill, assurance that the open space will be permanently protected from development, and development capital. Limited development is only appropriate for parcels of sufficient size and with appropriate conditions to allow creative development without endangering the resources that are meant to be protected. Before undertaking limited development, a land trust should ensure that its proposed actions will not endanger its mission as a conservation organization. The public that volunteers time and donates money may not readily accept the limited development concept, especially without an education effort by the land trust.

CONSERVATION INVESTMENT

Many real estate development ventures are financed through syndications, in which numerous individuals or entities join together. In return, the investors receive some combination of periodic income, capital gain upon resale, and, conceivably, significant tax benefits. This technique can be adapted for land conservation. Although the Tax Reform Act of 1986 reduced the income tax advantages for most types of real estate investments, creative tax-saving arrangements are still possible.

In some cases, a land trust may sell property subject to appropriate deed restrictions or conservation easements to a buyer looking for an aesthetically pleasing place to live or own a vacation home. In other cases, "charitable investors" may be persuaded to invest in land with deed restrictions that would allow only agriculture or other open space uses. Investors would receive a percentage of the operation's income and tax benefits (e.g., through depreciation of capital assets, deductions for business expenses, or deductions for mortgage interest payments),

as well as the satisfaction of knowing that they have helped to conserve open land.

The Recommended Growth Management Approach

Aside from the public spending and taxing policies, land acquisition techniques, and preservation and protection tools that the Territorial officials may select to support and help to implement the Comprehensive Land and Water Use Plan, the first decision that must be made is what form the land use regulations will take. It is strongly recommended that a new Code based on performance standards be adopted. This Code is proposed to include a coordinated package of standards which virtually all new development must adhere, including landscaping requirements, protection of steep slopes, wellfield/groundwater protection, floodplain protection, stormwater management, vegetation protection, and a number of other criteria. The package will also include overlay zones, and agricultural type zoning requirements. The following discussion explains why this approach is being recommended.

As traditionally, propounded, zoning reflects an unbounded faith in rationality - the belief that, with enough information, citizens can (and will) chart a path to an ideal allocation of land for future uses, creating a development pattern that maximizes efficiency and minimizes conflicts. To many of those directly involved in the development process - whether they be public sector officials or private developers - zoning has failed to regulate the use of land adequately. Some raise ideological objections: by its very nature, zoning interferes with property rights, one of the most closely held American values. Others marshal economic arguments against zoning, claiming that it distorts the market for land by purporting to correct market failures that may not even exist. For planners, perhaps the most serious charge leveled against zoning is that it has fostered the very kind of inefficient, destructive, and irrational land use patterns that they and their communities aim to discourage.

Most critics, however, especially those involved in the day-to-day business of land use regulation and development, know that zoning is unlikely to simply go away. It has endured several decades of well reasoned, sometimes influential criticism by academics and practitioners. Zoning enjoys wide popular support, largely because it has been an effective means of discouraging change. Zoning is perhaps most popular with those who live in single-family detached dwelling units, the land use that traditional zoning protects most fiercely. For this reason, zoning is politically important as well. Public officials know that voters look to zoning as a key means of protecting the value of their homes.

Under typical zoning codes, local elected officials exercise a

great deal of power in determining the direction and magnitude of changes in land use in their jurisdictions. Thus, they have a stake in continuing the traditional model, which offers many opportunities for legislative manipulation and negotiation. Zoning is also popular with the courts, which have repeatedly reviewed and accepted the rationale for controlling land development by this method. However, it should be noted that the zoning codes which have withstood challenges in the courts most successfully have been those that were based on comprehensive plans.

ALTERNATIVE TO ZONING

Land use professionals have expended an enormous amount of intellectual energy since the late 1950's devising alternatives to traditional zoning. Some individuals have called for radical reforms that reject virtually all the features of conventional zoning in favor of a market-oriented approach. To date, such approaches have gained little acceptance among planners and public officials.

Other alternatives, however, have been more successful in drawing adherents. In most cases, these alternatives are intended to transform a very basic sort of a tool into a more delicate instrument, one capable of more subtlety and selectivity than traditional zoning. Usually, these techniques introduce options to the traditional framework, offering developers incentives and more flexible application of requirements in exchange for more administrative leeway in making decisions. Such techniques as intensity districts, overlay zones, planned area development and clustering provisions all attempt to allow developers to respond more creatively to special physical conditions, to changing economic circumstances, or to shifts in technology or consumers' preferences. Whatever their derivation, alternative systems of land use regulation have a common goal: attempting to relax zoning's most rigid precepts, such as a strict segregation of land uses and duplicative administrative procedures. At the same time, such innovations are bound by zoning's political popularity and body of supporting case law. Therefore, they are almost always enacted within the context of a traditional zoning approach. The alternative systems differ from the traditional in one important respect, however: they open the door to administrative discretion in reaching a decision regarding a permit application. Although the requirements tend to be more flexible, they potentially are more arbitrary as well. Therefore, it is important to include as much objective criteria as possible for the decision-making body to base its decision upon; otherwise, it leaves itself open to legal challenges. This could call the entire Code into question.

More recently, taking their cue from comprehensive approaches to growth management, some communities have devised more far-reaching, flexible approaches to regulating land development.

These systems, under the name of "performance zoning," also aim to apply more flexible criteria, but within the dictates of more formalized administrative procedures. The flexibility is generally in terms of use or density. These types of systems scrutinize virtually all development proposals, not just those in certain areas or on sensitive parcels. It is precisely this type of land development regulation system that is being proposed for the Virgin Islands.

The performance-based land development regulation system that is being proposed has three basic characteristics:

1. It is being proposed to be adopted as the primary approach to regulating land uses in the Territory.
2. It will employ performance-based criteria and standards to determine appropriate uses and densities.
3. It will provide administrative mechanisms that offer predictable, consistent decisions.

Performance-Based Intensity Districts

Traditional land use controls relied on zoning as the major tool in regulating growth and development within communities. Traditional or Euclidean zoning relies on the segregation of land-uses from the "highest and best" use to the so-called "lowest and worst" use. It seeks to keep the most space between single-family housing and industrial uses. While this system worked well in New York City in 1916, its use is questionable in places like the Virgin Islands.

A Performance-Based Intensity District system has been proposed for regulating land use in the Territory. Intensity districts, as opposed to Euclidean zoning, focus on impacts on the surrounding environment, both underground and above it. Conceivably, many uses could exist within any given district. However, truly incompatible uses such as a rum distillery adjacent to a residential subdivision would not be allowed. Furthermore, there are density standards within the different intensity districts. These define the quantity of development so that it is consistent with the availability of infrastructure and environmental constraints and goals. The six intensity districts, and the uses allowed within them, are defined and discussed below.

Intensity Districts

The proposed Intensity Districts and their associated uses are described in detail in this section.

INTENSITY DISTRICT A: Agriculture

Agriculture

Establishments primarily engaged in the production of crops, plants, vines, trees or animals.

- Crop Farming
- Floriculture
- Horticulture
- Dairying
- Livestock Production

Agricultural Product Processing & Storage

Establishment primarily engaged in the processing of food products or by-products.

- Fruit Packing
- Canneries
- Milk Plants
- Warehouses
- Fruit and Vegetable Cold Storage

Dwelling

Buildings occupied or intended to be occupied for residential purpose and supporting activities. Living quarters for persons employed on the premises and not rented or otherwise used as a separate dwelling. Professional home occupation is subject to the provisions of home occupation in Chapter IX Section 3 of the VIDL (page 135).

- Single-family dwellings
- Two-family dwellings
- Boarding houses

Limited Public Utilities

Auxiliary facilities that provide electricity, sanitary services, water and other related services for public consumption.

- Water Pump Station
- Water Storage tanks
- Electrical Substation

Recreation

Passive recreation areas.

- Community Parks

INTENSITY DISTRICT 1: CONSERVATION

Agriculture and Mariculture

Establishments primarily engaged in the production of crop, plants, vines and trees, and the operation of hatcheries and preserves. Processing of food products or by-products is also permitted in this district.

- Food Crops
- Hatcheries

Herbs
Horticulture
Livestock
Food Processing
Animal Husbandry

Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

Single-Family Dwellings
Two-Family Dwellings
Home Occupations
Accessory Buildings/Structures
Planned Residential Development
Group Homes

Limited Government Services and Public Utilities

Government agencies and entities that provide administrative and public safety functions to the community. Auxiliary facilities which provide electricity, sanitary services, water and other related services for public consumption.

Postal Substations
Public Safety Substations
Libraries
Sewage Lift Stations
Electrical Substations
Health Services

Recreation

Active or passive recreational areas.

Ball Parks
Neighborhood Parks
Playgrounds
Community Parks

INTENSITY DISTRICT 2: LOW INTENSITY

Agriculture and Mariculture

Establishments primarily engaged in the production of crops, plants, vines and trees, and the operation of hatcheries or preserves. No processing of food products or by-products is permitted in this district.

Food Crops
Hatcheries
Plant Nurseries and Greenhouses

Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

Single-Family Dwellings
Two-Family Dwellings
Home Occupations

Accessory Building/Structures
Planned Residential Development

Schools

Any institution of learning.
Primary
Secondary
Special Education
Nursery

Retail Trade

Establishments primarily engaged in providing finished products generally to individuals.
Books and Stationery
Candy and Confections
Dairy Products
Groceries
Households Items

Overnight Accommodations

Bed and Breakfast Inns

Personal Services

Establishments primarily engaged in providing services generally to individuals
Barber Shops
Beauty Salons
Dentists
Doctors

Limited Government Services and Public Utilities

Government agencies and entities which provide administrative and public safety functions to the community. Auxiliary facilities which provide electricity, sanitary services, water and other related services for public consumption.
Postal Substations
Public Safety Substations
Libraries
Sewage Lift Stations
Electrical Substations
Health Services

Recreation

Active or passive recreational areas.
Ball Parks
Neighborhood Parks
Playgrounds

There will be a minimum lot size of 20,000 square feet with a residential density of ten (10) bedrooms per acre. Commercial development in this district will have a maximum floor area ratio of 0.3.

INTENSITY DISTRICT 3: MODERATE INTENSITY

Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

- Single-Family Dwellings
- Two-Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Planned Residential Development
- Group Homes

Hotels & Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests.

Large resorts are not permitted in this district.

- Apartment Hotels
- Hotels
- Bed & Breakfast Inns
- Hostels
- Guesthouses

Schools

Any institution of learning.

- Primary
- Secondary
- Special Education
- Nursery
- Art
- Business Trades

Retail Trade

Establishments primarily engaged in providing finished products generally to individuals.

- Apparel & Accessories
- Books & Stationery
- Candy & Confections
- Dairy Products
- Electrical & Electronic Products
- Groceries
- Restaurants
- Household Items
- Community Shopping Centers
- Smaller Supermarkets

Personal Services

Establishments primarily engaged in providing services generally to individuals.

- Barber Shops
- Beauty Salons
- Dentists

Doctors
Funeral & Crematory Services
Shoe Repair Shops
Opticians

Business Services

Establishments primarily engaged in rendering services to business establishments on a contract or fee basis.

Advertising Agencies
Legal Services
Accounting Services
Finance, Insurance and Real Estate Services
Employment Services
Dental/Medical Laboratories

Government Services and Limited Public Utilities

Government agencies which provide executive, legislative, judicial, regulatory and administrative functions to the community. Auxiliary facilities which provide electricity, sanitary services, water and other related services for public consumption.

Postal Services
Courthouses
Government Offices
Public Safety
Consulates
Libraries
Sewage Lift Stations
Electrical Substations

Recreation/Recreational Services

Active or passive recreational areas of establishments engaged in providing amusement or entertainment services. Night clubs are not permitted in this district.

Ball Parks
Urban Parks
Playgrounds
Health Clubs

There will be a minimum lot size of 10,000 square feet with a single-family residential density of four (4) units per acre; two-family structures may be developed at an overall density of eight (8) units per acre; and attached housing may be built at a density of eight units to the acre.

Community development in this district will have a maximum floor area ratio of 0.5.

INTENSITY DISTRICT 4: HIGH INTENSITY

Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

Single-Family Dwellings
Two-Family Dwellings
Multi-Family Dwellings
Home Occupations
Accessory Buildings/Structures
Boarding Houses
Group Homes

Hotels and Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests. Apartment Hotels
Hotels
Bed & Breakfast Inns
Hostels
Guesthouses

Schools

Any institution of learning.
Primary
Secondary
Special Education
Nursery
Art
Business Trades
Vocational

Retail/Wholesale Trade

Establishments primarily engaged in providing finished products generally to individuals and retailers.
Apparel & Accessories
Books & Stationery
Candy & Confections
Dairy Products
Electrical & Electronic Products
Furniture
Groceries
Household Items
Office Furnishings and Equipment
Photographic Equipment
Sporting Goods
Gasoline Filling Stations
Shopping Centers
Automobile Sales and Service
Restaurants
Supermarkets

Personal Services

Establishments primarily engaged in providing services generally to individuals.
Barber Shops
Beauty Salons

Dentists
Doctors
Funeral & Crematory Services
Shoe Repair Shops
Opticians
Automobile Repair & Servicing

Business Services

Establishments primarily engaged in rendering services to business establishments on a contract or fee basis.

Advertising Agencies
Legal Services
Accounting Services
Finance, Insurance and Real Estate Services
Employment Services
Dental/Medical Laboratories

Government Services and Limited Public Utilities

Government agencies which provide executive, legislative, judicial, regulatory and administrative functions to the community. Auxiliary facilities which provide electricity, sanitary services, water and other related services for public consumption.

Postal Services
Courthouses
Government Offices
Public Safety
Consulates
Libraries
Sewage Lift Stations
Electrical Substation

Recreation/Recreational Services

Active or passive recreational areas of establishments engaged in providing amusement or entertainment services.

Ball Parks
Urban Parks
Playgrounds
Night Clubs
Health Clubs

There will be a minimum lot size of 6,000 square feet with a residential density ranging from six (6) units per acre for single-family housing to fifteen (15) units per acre for multi-family dwellings.

Community development in this district will have a maximum floor area ratio of 1.0.

INTENSITY DISTRICT 5: URBAN

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

Single-Family Dwellings
Two-Family Dwellings
Multi-Family Dwellings
Home Occupations
Accessory Buildings/Structures
Boarding Houses
Group Homes

Hotels and Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests. Apartment Hotels
Hotels
Bed & Breakfast Inns
Hostels
Guesthouses

Schools

Any institution of learning.
Primary
Secondary
Special Education
Nursery
Art
Business Trades
Vocational

Retail/Wholesale Trade

Establishments primarily engaged in providing finished products generally to individuals and retailers.
Apparel & Accessories
Books & Stationery
Candy & Confections
Dairy Products
Electrical & Electronic Products
Furniture
Groceries
Household Items
Office Furnishings and Equipment
Photographic Equipment
Sporting Goods
Gasoline Filling Stations
Shopping Centers
Automobile Sales and Service
Restaurants
Supermarkets
Jewelry

Personal Services

Establishments primarily engaged in providing services generally to individuals.
Barber Shops/Beauty Salon
Dentists

Doctors
Funeral & Crematory Services
Shoe Repair Shops
Opticians

Business Services

Establishments primarily engaged in rendering services to business establishments on a contract or fee basis.

Advertising Agencies
Legal Services
Accounting Services
Finance, Insurance and Real Estate Services
Employment Services
Dental/Medical Laboratories

Government Services and Limited Public Utilities

Government agencies which provide executive, legislative, judicial, regulatory and administrative functions to the community. Auxiliary facilities which provide electricity, sanitary services, water and other related services for public consumption.

Postal Services
Courthouses
Government Offices
Public Safety
Consulates
Libraries
Sewage Lift Stations
Electrical Substations

Recreation/Recreational Services

Active or passive recreational areas of establishments engaged in providing amusement or entertainment services.

Amusement Parks
Ball Parks
Urban Parks
Playgrounds
Night Clubs
Health Clubs

There will be a minimum lot size of 3,000 square feet with a residential density ranging from twelve (12) units per acre for single-family housing to thirty (30) units per acre for multi-family dwellings.

Community development in this district will have a maximum floor area ratio of 1.0.

INTENSITY DISTRICT 6: INDUSTRIAL

Manufacturing/Mining

The processing or assembling of materials or substances into a finished product and the extraction of naturally occurring solids,

liquids or gases.

- Bakeries
- Canvas Goods
- Alumina & Related Products
- Cement/Concrete Products
- Dyeing & Finishing of Textiles
- Beverages
- Leather Goods
- Jewelry & Precious Metals
- Pharmaceutical Products
- Glass Making
- Petroleum Products
- Water Distillation
- Watch Assembly
- Quarries
- Paper Products

Wholesale/Storage/Distribution

Establishments engaged in the storage, trucking or transfer of household or commercial goods of any nature; or establishments engaged in the sale of large quantities of goods.

- Equipment and Machinery
- Warehouse
- Apparel
- Spirits
- Tobacco
- Pharmaceutical Products
- Freight Transportation
- Janitorial Supplies
- Health Supplies
- Vending Machines
- Water Delivery

Industrial Services

Establishments engaged in mechanized personal, business and repair services.

- Automobile Repair Shops
- Towing & Wrecking Services
- Laundromat & Dry Cleaning
- Electrical & Electronic Equipment
- Construction Services
- Janitorial Services
- Crematorium
- Septic Cleaning & Installation

Public Utilities

Activities which provide electricity, sanitary services, water and other related services for public consumption.

- Electrical Generating Plants
- Water Distillation Plants
- Sewage Treatment Plants
- Solid Waste Collection

Solid Waste Disposal/Incineration
Propane/Gasoline/Other Petroleum Products
Port Facilities

Limited Retail/Recreational

Restaurants
Night Clubs

Schools

Institutions of learning.
Vocational

The permitted densities and lot area requirements will vary based on the proposed use of the subject property.

DISTRICT 1W: WATER/CONSERVATION

This district is comprised of all territorial waters and submerged lands not otherwise zoned. Water areas in this district include commercial fishing areas, recreational beaches, navigational lanes, and ecologically sensitive areas such as sea grass beds and coral reefs.

DISTRICT 2W: WATERFRONT-LOW INTENSITY

Mooring (for full-time commercial fishermen)
Public Access Docks/Ramps
Research Facilities

DISTRICT 3W: WATERFRONT-MODERATE INTENSITY

Mooring and Anchoring of Vessels
Private Docks
Public Access Docks/Ramps
Sewage Pump-out Facilities

DISTRICT 4W: WATERFRONT-HIGH INTENSITY

Marinas
Boat Yards
Marine Craft Sales
Boat Charters

DISTRICT 6W: WATERFRONT-INDUSTRIAL

Port Facilities
Marine Terminals
Boat Yards
Marine Craft Sales
Marinas

Performance Standards

Within any intensity district there are 15 performance standards that must be considered before any permitting may take place. In many instances, only a limited number of these standards may apply. These standards are intended to protect the natural as well as man-made environment. Each of the standards is listed below:

- Recreation and Open Space
- Environmental Protection
- Stormwater Management
- Impervious Surfaces
- Landscaping Requirements
- Vegetation Protection
- Off-Street Parking and Loading
- Sign Standards
- Historic and Cultural Conservation
- Wellfield and Groundwater Protection
- Floodplain Protection
- Agricultural Preservation
- Hillside Protection
- Residential Uses
- Non-Residential Uses

Plan Implementation

In virtually every American community, planners, elected officials and citizens look to zoning to control development. Zoning has long reigned as the major tool in the planner's arsenal. This has been the case since 1916, when New York City enacted the first comprehensive zoning ordinance. By 1926, the U.S. Supreme Court put to rest any doubt that zoning laws, which restricted an individual's right to develop his property in any way that he saw fit, were constitutional exercises of a community's police power.

In the landmark case known as the Village of Euclid (Ohio) vs. Ambler Realty Company, the high court upheld the validity of an ordinance (or law) that divided all of the community's area into separate zoning districts, and prescribed minimum dimensional and density requirements for all permitted uses. Today, "Euclidean Zoning" (as it has come to be known) exists in virtually every community in the country, including the Virgin Islands. The theory of this approach is that the separation of land into distinct districts allows for the sorting of uses based on their compatibility (Kendig, 1980).

Although the history of Euclidean zoning spans approximately 67 years, it has failed to promote the efficient use of land resources. In an attempt to provide developers with inexpensive land, zoning permitted scattered development. This created the development pattern called the urban sprawl (Callies & Freilich, 1986, p. 796). As a result of the sprawl, forests have been felled, floodplains and coastal areas have been filled, and

agricultural lands have been destroyed. In addition, it has substantially increased the cost of providing public facilities and services to residents.

The zoning maps that were enacted as part of the 1972 Zoning Code for the Territory were based upon continental United States models. While states such as Florida, with its mile after mile of relatively flat land, might be quite receptive to low-density land development patterns, it is simply inappropriate in the Territory, with its finite land resources and mountainous terrain.

The weaknesses of traditional zoning indicate a need to explore alternative methods of dealing with land development control mechanisms. As was mentioned earlier in this report, a performance-based approach has been selected as a feasible alternative. It is felt that this technique will enable the Territory to better plan for its future population while to some extent safeguarding the natural, social, and economic qualities that have made it an attractive place to live. This system employs minimum levels of performance by setting standards that must be adhered to by each land use.

The zoning maps that will accompany the new V.I. Development Law (as the Zoning Code for the Territory will be known in the future) will largely coincide with the Land and Water Use Plan maps for each island that have been discussed earlier. The V.I. Development Law (VIDL) itself will regulate all permitted uses and structures as a function of the particular impacts that are inherent in each use.

Comparison of the Old Zoning Code with the New Virgin Islands Development Law

There must be an analysis and comparison between the current Code and the proposed VIDL. No matter how well the justification is made that this new system will be far more effective in dealing with land development issues, members of the public will want to know what they can do with their property.

The tables on the following pages are matrices that compare the uses that are permitted in each of the current zoning districts with where they would be allowed under the intensity districts that are proposed to accompany the VIDL. The first Table is a matrix that, in an overall manner, compares the current Zoning Code's permitted uses, by district, with what uses are proposed to be allowed in the V.I. Development Law's Intensity Districts. The upper left-hand box contains the numbers "43/61." These numbers indicate that of the 61 land use types that are currently permitted in the A-1 Agriculture District, 43 of them would be

allowed in Intensity District 1 under the proposed V.I. Development Law. All of the boxes make the same kind of comparison between the old and new systems. This general analysis has been performed to show the property owner broadly how the intensity districts compare and contrast with the current zoning districts. Generally speaking, Intensity Districts A, 1, and 2 are comparable to the present A-1, A-2, and R-1 Districts. Most of the uses that are currently allowed in these classifications would be permitted in Intensity Districts 1 or 2. Further, the types of activities that are currently allowed in A-1, A-2, or R-1 that would not be under the proposed system include such uses as the sale of agricultural machinery, airports, colleges, community centers, rest homes, hospitals and movie theaters. It is not anticipated that there would be any great demand for these types of activities in the Territory, in any event.

Intensity District 3 most closely resembles the present R-2, R-3, and R-4 Districts in terms of the uses permitted and general character that is desired for these areas. With regard to the Comprehensive Land and Water Use Plan, Intensity District 3 is viewed as being primarily residential in nature, while allowing supporting uses (i.e., convenience/neighborhood commercial, schools, clinics, etc.) within their confines. Those areas designated in Intensity District 3 are either served by the public waste and/or sewer facilities, or could be done so with minimal expansion of existing lines. In comparing Intensity District 3's proposed permitted use list with what is currently allowed, boarding houses, rest homes, golf course development, multi-family housing, community centers, hospitals, and laundries are representative of the uses currently allowed that would not be permitted in the future. With the exception of golf courses, the uses are of a greater intensity than what is considered appropriate for Intensity District 3. Golf courses, on the other hand, are thought to be more conducive for Intensity Districts 1 and 2.

The R-5, B-2, B-3, B-4 and C Districts in the existing Zoning Code are, to a great extent, accommodated by Intensity District 4 in the proposed V.I. Development Law. The main difference is that residential uses are allowed throughout Intensity District 4, whereas they are not currently permitted in the B-4 and C Zones in the current regulations. Additionally, most industrial activities are not considered appropriate for inclusion in Intensity District 4. They are currently allowed in the C Zone. They have been removed because it is considered, on the one hand, better to promote these activities in areas that are more conducive to industrial and manufacturing activities, while on the other hand, to allow them in Intensity District 4 would be too intensive an activity for these areas.

Intensity District 5 essentially corresponds to the present B-1 Zone. This urban district designation is intended to reinforce

and strengthen the primary activity centers of Charlotte Amalie, Christiansted, Frederiksted, and Cruz Bay to the greatest extent possible. Virtually every activity currently allowed in the C Zone would be permitted in Intensity District 5, with the exception of plant nurseries. This type of use is more appropriately located in Districts 1 and 2.

The I-1, I-2, and W-2 Zones most closely resemble Intensity District 6 in terms of the character envisioned and uses permitted. With the exception of agricultural processing and dairies (permitted in Intensity District 1), and gas stations and car dealerships (proposed to be located in Intensity District 4), virtually all other uses in the existing ones would be allowed in Intensity District 6.

Comparison of Uses Permitted in the Current Zoning Code with the Proposed Virgin Islands Development Law

To determine which of the specific uses from the current Zoning Code's districts would be allowed under the VIDL, the tables on the following pages provide this information. In each table, the uses that are currently permitted, whether by right or as a conditional use, have been listed in the left column. Looking across the top of the matrix, there are six (6) columns labeled Intensity Districts 1 through 6. These Intensity Districts will be used on the zoning maps that will accompany the VIDL, and essentially correspond to the Intensity Districts proposed and discussed in this report.

The dots on each matrix sheet indicate where uses allowed in the current Zoning Code classification would be permitted in the Intensity District system. If the dot has been left "open" (or "white"), that means that the use shown in the left column would not be allowed in the intensity district under which the open dot is found. A filled-in, (or "black") dot indicates that the use is allowed, as currently envisioned, under the Intensity District where it is found. For instance, again referring to the matrix sheet for B-2 (Neighborhood Business), and determining where retail sales would be allowed under the new VIDL, it can be seen that they would be permitted in Intensity Districts 2 through 5, but not in Intensity Districts 1 and 6.

This comparison was performed for all 18 of the districts under the existing Zoning Code, and there are matrix sheets for each. It has been the primary intent to allow for greater flexibility by permitting a greater variety of uses to occur in any given intensity district. Through an examination of the 18 matrices, this is exhibited. The difference from the existing regulatory system is that strict adherence to a series of performance standards is required. This will be explained in detail in the next section. The premise of the system is that it is not the use that is so important to regulate (although there are obvious

incongruities to be avoided, such as mixing industrial activities with residential development), as it is the intensity of the use.

Also important to consider and control is the intensity of any use, given the physical constraints (or opportunities) that exist in the area where the activity is proposed. For example, although multi-family housing is allowed in a number of different intensity districts, the degree to which this development may occur will depend on such factors as how steeply the land is sloped, whether stormwater runoff can be controlled on the site, whether there are any floodplains that must be dealt with, and whether protection of groundwater resources is an issue in the area, etc.

Putting It Together - How the Performance-Based System Works

The following discussion focuses on a specific site for each of the islands in which the Performance-Based Intensity District System is applied. Because performance zoning districts are designed carefully on the basis of intensity distinctions, geographic considerations, and community fiscal and planning policy, they must be mapped with special care. Thereafter, there should be minimal rezoning, because the initial zoning will have already been designed to accommodate all development for the long range (approximately ten years) at locationally appropriate sites.

The Performance Standards section is the heart of the new VIDL. In a conventional zoning code, such as that which exists in the Territory, the landowner would, at the time development is contemplated, first refer to the zoning map to determine the district classification of the property. He would next consult the listing of uses permitted in that district and check the dimensional and density requirements for the district. The requirements of this Euclidean Zoning system have been established with no particular reference to the site for which development is proposed. This system virtually ignores such major variables as the uses of the surrounding land and the impact the proposed use will have on them, the environmental constraints, and the other limitations of the subject site.

Under performance-based zoning, the first two steps are identical. The site must be located and its district classification identified to know what uses are permitted in that district. At this point, the similarities between the two systems diverge. In conventional zoning, the first and second steps narrow the range of development options dramatically. In the performance zoning system that is proposed for the Virgin Islands, nearly all options remain open with respect to Intensity Districts 3, 4, and 5. These districts have been sized and located to accommodate the majority of the growth that is expected to occur on their respective islands for the next ten years. Therefore, they comprise no small part of the total area zoned. Standards for the districts have been assigned by criteria that establish a "district character." Performance standards then apply site

specific regulations. The landowner is first required to analyze the capacity of his site in terms of its physical suitability for development. Natural resource limitations (such as floodplains and steep slopes on the site) and provisions for required open space, for example, are to be taken into consideration at this point. Next, as the developer refines his plans for the property, he must address issues such as vegetation protection, landscape provision, stormwater runoff, hillside protection, and historic and cultural conservation (if necessary). Finally, standards are established to ameliorate any negative effects caused by off-street parking and/or loading areas, signs, and buildings that may have an adverse impact on existing adjacent development.

The following discussions detail the land-use intensity system and performance standards, including natural resources protection and criteria for signs, historic preservation, and landscaping.

ST. THOMAS

SITE DESCRIPTION AND INTENSITY DISTRICT DESIGNATIONS

The sector that has been selected for analysis on St. Thomas focuses on the Donoe area, on the east side of Raphune Hill. The heart of this area, at the intersection of Weymouth Rhymer Highway and the Donoe Road, has been selected as the site for the new Government Center on St. Thomas. Therefore, it is likely to receive considerable development pressure from now to the end of the century. Additionally, although the site is outside the Charlotte Amalie urban area, it is only 1-1/2 miles from the St. Thomas Hospital and 2-1/2 miles from Post Office Square. Weymouth Rhymer Highway is the main connector between the shopping, employment, and entertainment center that is Charlotte Amalie and one of the island's major residential communities in Tutu. The growing volume of traffic along this roadway had led to several small strip commercial developments being installed along the highway. From discussions held with various Government officials, it has been learned that there is a reasonably high probability that significant amounts of groundwater exist in the area that could supplement the island's potable water supply. However, the development of a car dealership, gas stations, and dry cleaning operations in this area have contaminated this potential water supply source. South of the highway, the land is largely vacant and has quite pronounced steep terrain. North of Weymouth Rhymer Highway, the topography varies, with reasonably developable land on the immediate west side of the Donoe Bypass, becoming increasingly precipitous farther west and north towards Wintberg Hill.

From the standpoint of the Comprehensive Land and Water Use Plan, the area is viewed as being transitional, connecting the built-up areas of Charlotte Amalie and Tutu. Much of the land straddling Weymouth Rhymer Highway has been designated in Intensity District

3. This would allow single- and two-family residential development on 10,000 square foot lots, as well as hotels and guest houses, schools, retail sales and services (primarily of a smaller, neighborhood scale), and smaller business service establishments such as law offices, accounting services, and real estate offices. General government services would be permitted, as would recreational facilities.

At the intersection of Weymouth Rhymer Highway and the Donoe Road and extending north, on both sides of the Bypass, an area designated as Intensity District 4 has been indicated. This higher intensity district includes the site selected for the Government Center. Other uses that would be permitted in this district include single-family, two-family, and multi-family residential development on a minimum lot size of 6,000 square feet. Additionally, hotels and guesthouses, schools (including vocational-technical schools), retail sales of a higher order (i.e., supermarkets and shopping centers), business and personal services, government offices, and recreational facilities would be considered appropriate in this district.

The northern and southern extremes of this area selected for discussion have been designated as Intensity District 1. These areas, because of their steep slopes, are considered to be environmentally constrained. While single- and two-family homes would be allowed, as well as some limited Government operations and recreational facilities, the degree and intensity of development allowed would be dependent upon how much the developer could accomplish after dealing with hillside protection, stormwater management, and other natural resource protection performance standards.

APPLICATION REQUIREMENTS AND PROCEDURES

Once an individual decides that he wants to develop his parcel in this area, the first thing he must do is determine if his project will be classified as major or minor insofar as the VIDL is concerned. The following table indicates the threshold for major project determination:

Table 30
Major Project Determination Thresholds

Intensity District	Acreage	Non-Residential Floor Area	Dwelling Units	Subdivision of Lots
1	10 Acres		20	10
2	10 Acres	2,000 S.F.	25	20
3	15 Acres	25,000 S.F.	100	40
4	N/A	60,000 S.F.	100	40
5	N/A	25,000 S.F.	25	20
6	N/A	100,000 S.F.	N/A	N/A

It is to be noted that if an individual wishes to build only a single-family or two-family residence on his property, he will not be subject to most of the performance standards contained in the Law.

If it is determined that the proposed development will be minor in nature, using the standards in the above table, then the following procedure shall be followed to receive a development permit.

MINOR DEVELOPMENT PERMIT PROCEDURES

Upon receipt of an application for a minor permit which is deemed complete by the DPNR, written notice of the filing of such application to any person who has requested such notification in writing shall be given. In addition, such notice shall also be given to any person determined to be affected by or any person interested in such development. DPNR shall act upon an application for a minor permit deemed completed within 60 working days after receipt thereof. Failure to act within such time limits shall constitute an action taken and shall be deemed an approval of such application. A copy of the decision on an application for a minor permit shall be transmitted in writing to the applicant and to any person who has requested a copy thereof.

Any action by DPNR shall become final after the 45th working day following a decision, unless an appeal is filed with the Board of Land Use Appeals within such time. If such an appeal is filed, the operation and effect of the action shall be stayed pending a decision on appeal.

If an application for a minor permit is denied by DPNR or by the Board of Land Use Appeals, the applicant may submit another application for a permit no sooner than 120 working days after the date of such denial.

All applications for minor permits shall contain at least the following information to determine that all provisions of the Law have been met:

- A site plan of the property illustrating the proposed development and including, but not limited to, the following:
 - (1) Topographical features showing present grades and any proposed grades are to be altered. When required, contours at an interval not greater than five feet shall be shown;
 - (2) Property boundary lines and dimensions including any platted lot lines within the property;

- (3) Location and dimensions of all existing and proposed buildings, including height in stories and feet and including total square feet or ground area coverage;
- (4) Location and dimensions of all driveways and entrances and minimum yard dimensions and, where relevant, relation of yard dimensions to the height of any side of any building or structure;
- (5) Location and dimensions of parking stalls, access aisles, and total area of lot coverage of all parking areas and driveways;
- (6) Location and dimension, including height clearance, of all off street loading areas;
- (7) Location, designation and total area of all usable open space, including the use of any paved areas, as distinguished from sodded or other landscaped areas;
- (8) Location and height of fences, walls including retaining walls, or screen planting, and the type or kind of building materials or planting proposed to be used;
- (9) Proposed surface stormwater drainage treatment;
- (10) Location of easements of other rights-of-way; and
- (11) Location and designation of any open storage space;

- A location map showing, at a minimum, the uses of all property across the street or alley from or adjoining the boundary of the subject property, including the following:

- (1) All streets, alleys or other public rights-of-way, public parks and places and all lots and lot lines, guts, waterways, and easements;
- (2) All structures and the principal use of each structure, including the type of residential, business, commercial, industrial, or waterfront use; and
- (3) All off-street and loading areas as may be significant to the application in question.

- Any other information as may be required by DPNR to determine that the application is in compliance with this Law shall be furnished, including but not limited to floodplains, elevations, profiles, perspectives or any other material necessary for a complete understanding of the application.
- A statement in writing signed by the applicant stating that the information as shown on the plans, maps, and applications is true and correct.

A minor permit shall be granted if it is found that the development complies with each of the following criteria: (1) the development is consistent with the goals, policies, requirements, performance standards and other standards; (2) the development is consistent with the goals, policies, and standards of the Coastal Zone Management Act; and (3) the development project as proposed incorporates, to the maximum extent feasible, mitigation measures to substantially lessen or eliminate all adverse environmental impacts of the development.

If, however, the project is deemed to be major in its scope, the applicant will be subject to a more intensive review process. The requirements and procedures for major developments are included in the following section.

Major Project Review Requirements

Upon determination by DPNR that an application for a major permit is complete, a copy thereof shall be transmitted to all relevant public agencies for review and comment within 30 working days. DPNR shall schedule a public hearing to be conducted within 60 working days of the receipt of the application. A major project permit application shall be acted upon within 30 working days after the conclusion of the required public hearing and a permit shall be issued if the project complies with all requirements of the VIDL. Failure of the Government to act within the time limits specified shall constitute an action taken and shall be deemed an approval of an application for a major project.

Any action shall become final after the 45th working day following a decision, unless an appeal is filed with the Board of Land Use Appeals within such time. If such an appeal is filed, the operation and effect of the action shall be stayed pending a decision on appeal.

If an application for a permit is denied, the applicant may submit another application for a permit no sooner than 120 working days after the date of such denial.

Because major development at any location within the Territory may

have direct or indirect impacts on the ability of the people of the Territory to access, see, and enjoy their coastal resources, and in order that the Government may ascertain the nature of those impacts and balance their beneficial and detrimental aspects, the applicant shall provide the following information in connection with any major development proposal:

Water Impacts

An explanation of how the runoff or effluent from the proposed development, or change in existing ground or surface water flow, will improve or degrade the quality of water used by the people of the Virgin Islands as beneficiaries of the public trust.

Employment Impacts

An explanation of how the jobs created, eliminated or modified by the proposed development will help or hinder the people of the Virgin Islands in obtaining employment in those coastal-dependent sectors of the economy such as commerce, trade, navigation, fishing, and tourism, which have been the traditional occupations of public trust beneficiaries.

Self-determination Impacts

An explanation of how the ownership, control and management of the proposed development will add to or detract from the ability of the people of the Virgin Islands to supervise, administer, and profit from the sectors of the economy that benefit from the public trust, such as commerce, trade, navigation, fishing, and tourism.

Recreation Impacts

An explanation of how the proposed development will assist or retard the ability of the people of the Virgin Islands to exercise their rights to use their beneficial interest in the public trust for recreational purposes.

Productivity Impacts

An explanation of the extent to which the proposed development will enhance or restrict the ability of the Government of the Virgin Islands to exercise its responsibilities as Trustee to administer the resources of the public trust in a manner that is both economically and ecologically productive.

Sustainability Impacts

An explanation of how the proposed development will or will not provide sustainable benefits that will enable the Government of the Virgin Islands to exercise its responsibility to deal impartially with present and future beneficiaries, including: the extent to which either or both the beneficial and adverse impacts of the proposed development fall disproportionately on either the current people of the Virgin Islands or on future people of the Virgin Islands; and the extent to which the impacts of the proposed development are irreversible.

Access Impacts

An explanation of how the proposed development will increase or decrease the accessibility of coastal resources of the people of the Virgin Islands.

A major project permit shall be issued if the Government makes findings, based on substantial evidence in the record, that the development complies with each of the following criteria:

- (1) The development is consistent with the goals, policies, requirements and standards provided in this Law;
- (2) The development is consistent with the goals, policies, and standards of the Coastal Zone Management Act;
- (3) The development will produce a net benefit for the public trust for the people of the Virgin Islands;
- (4) The development has been conditioned to require that it incorporate such feasible mitigation measures as will be necessary to eliminate or substantially lessen any and all adverse environmental impacts;
- (5) The development complies with all dimensional, density, and use requirements for the intensity district in which it is located, as well as performance standards in regard to:
 - (a) protection of common open space, including off-site open space
 - (b) recreation and open space facilities
 - (c) off street parking and loading
 - (d) vegetation protection
 - (e) hillside protection

- (f) signage
 - (g) stormwater and drainage
 - (h) landscaping
 - (i) groundwater protection
 - (j) historic and cultural conservation
- (6) Easements have been conveyed to the Government of the Virgin Islands as necessary to:
- (a) ensure that there will be no development of land having a slope greater than 45 percent;
 - (b) insure that the development will produce a net benefit for the public trust for the people of the Virgin Islands;
- (7) Such public facilities have been dedicated as may be needed to insure that the development complies with any standards of this Law;
- (8) The development is consistent with the Comprehensive Land and Water Use Plan; and
- (9) If the development contains more than five housing units, the Commissioner has found that at least 25 percent of those units will be affordable housing.

Some natural features, such as the drainage guts, are so intolerant of development that they must remain entirely in open space. Others, such as natural vegetation and hillsides, require less protection, or fare less well when the public benefit to be derived from their protection is balanced against the burden (cost) to the landowner who might otherwise realize considerable economic returns from the developments of such land.

Basically, what would be required of an individual who intends to develop a neighborhood oriented commercial venture on a parcel of land in Intensity District 3 in this sector would be a series of plans that indicate how he intends to deal with a variety of natural resource issues. He would have to prepare an overall site plan showing the existing topography and how he proposes to reshape the land to accommodate his development. He must show how he intends to retain at least the first inch of rainwater from a 24-hour, 25-year storm entirely on his site to mitigate any downstream stormwater runoff problems. He must prepare landscape drawings that show the extent to which he is preserving native vegetation, how he is meeting the standards for the plantings required in and around off-street parking areas and, if necessary, how he intends to meet the buffering requirements to minimize any adverse impacts to adjoining residential areas. He would also have to indicate that he is proposing no use that would violate the integrity of the groundwater resources in the area, nor is he planning to develop his property in such a way that would restrict the percolation of stormwater back into the groundwater supply.

All of these plans must be prepared by appropriate qualified professional (e.g., civil engineers, landscape architects, water resource specialists, architects, etc.) to the scale specified by the Department of Planning and Natural Resources (DPNR).

Performance zoning requires a different administrative approach from conventional zoning. Because the performance criteria are complex, the detailed site plan review must be completed prior to any building permits being issued. It makes considerable sense to integrate the various reviews into one process. This comprehensive review will require a trained staff, but not necessarily a new one. The staffing needs and requirements for DPNR to administer this process will be discussed later in this section.

ST. CROIX

SITE DESCRIPTION AND INTENSITY DISTRICT DESIGNATIONS

The sector selected for analysis on St. Croix includes the transitional area in the central portion of the island that includes Strawberry Hill, Limetree, Mary's Fancy, Barren Spot, LaReine, Bonne Esperance, and Clifton Hill. The eastern portion of Melvin Evans Highway runs along the southern border of this area and is creating significant development pressures in its wake. This area is also immediately north of the Hess Oil Refinery. To the north, the sector includes some steeply sloped areas and is immediately south and east of Mon Bijou and Glynn.

In the southeast portion of this sector, including Barren Spot and Spanish Town and immediately north of Melvin Evans Highway, Intensity District 4 has been indicated as the most appropriate designation. This district allows for small lots (6,000 square feet), single- and two-family housing and multi-family residential development. Also permitted would be light manufacturing and warehousing and storage uses. These types of activities would be appropriate uses adjacent to the highway where their traffic demands could be accommodated.

Southwest of this area is a large tract encompassing Clifton Hill that has been designated as Intensity District 3. Another Intensity District 3 area includes Strawberry Hill. This would allow for the development of one-family and two-family dwellings on 10,000 square foot lots, as well as neighborhood-scaled commercial activities, schools, business and professional services, some limited government functions, and recreational uses.

LaReine, Bonne Esperance and much of the Mary's Fancy area are included within Intensity District 2. This relatively steeply sloped sector of St. Croix is not presently served with public

water or sewer service, nor is it likely in the future. Single- or two-family homes on half-acre lots would be permitted in this area, as would parks, limited government operations, and neighborhood commercial facilities.

Limetree and the remainder of Mary's Fancy have been designated as Intensity District 1. Because of both its steep slopes and floodplains, it is not the most appropriate site for urban development. Because of the environmental constraints of this area, development options will be restricted by designating it Intensity District 1.

All of the performance standards to which a developer would have to adhere and that were discussed in the St. Thomas study area would likewise apply to this example on St. Croix. Additionally, a case in which a developer would propose to build a small retail commercial venture that is surrounded by single- and two-family housing in Intensity District 3 should be discussed and analyzed.

Because it is important to minimize any negative impacts on existing development, although retail sales operations are allowed in Intensity District 3, they are not intended to be allowed anywhere in the district. First of all, they would only be allowed on roadways designated as collectors or minor arterials. Second, only a certain number of these would be permitted along any given roadway, and this would be related to the holding capacity population of the retail facility's catchment area and the number of such facilities that the geographic area can support. Third, the proposed site must have a minimum number of linear feet of frontage, so that adequate access and egress can be provided. Finally, a plan would have to be submitted that indicates the amount and location of off-street parking, how off-street loading is to be dealt with, how the landscaping requirements are to be met and, if the site abuts any residential areas, how the use will be visually buffered.

ST. JOHN

SITE DESCRIPTION AND INTENSITY DISTRICT DESIGNATIONS

The sector starting at Enighed Pond, immediately south of Cruz Bay and extending east northeast through the Bethany area, is the one that has been selected for analysis on the island of St. John. Located southeast of the Cruz Bay community, the seaward portions of this site are, relatively speaking, under intensive development pressures. The Enighed portion of this area has, in recent years, received some of the "overspill" population from Cruz Bay. Enighed Pond itself has been designated as Intensity District 6W.

This district is associated with industrial port facilities and activities as well as the land-based operations that commonly go

along with them. This area, when completed, will contain new potable water and sanitary sewer facilities to serve this area of St. John, as well as the industrial port operations as contemplated by the Port Authority. In addition to requiring adherence to these use activities designated for this area, all development would also have to abide by the Mooring and Anchoring Laws which are proposed to become part of the overall VIDL.

Moving eastward through the Enighed community, the area has been designated as Intensity District 3. This moderate intensity development district would allow for single- and two-family homes on lots containing at least 10,000 square feet. It is assumed that, over the course of the next ten years, the sewage treatment plant will be operational at Enighed Pond, and that sanitary sewage can be gravity-fed from housing and other uses in this area to the plant. Other activities that are permitted in this district include neighborhood-scaled commercial facilities, smaller hotels and guesthouses, limited government operations, and recreational areas.

The easternmost stretches of this study area are located on lands classified in the Intensity District 2 category. This area is on rather steeply sloped land, where public water and sewer service in the future is considered to be unlikely. Single and/or two family homes on 20,000 square foot lots would be permitted, as would neighborhood commercial facilities, schools, limited government services, and park and recreation areas.

Notwithstanding the fact that the area from Enighed to Bethany is designated as Intensity District 3, which allows for homes to be built on 10,000 square foot lots, whether this can be accomplished on all parcels, given the performance standard requirements, is problematic. In particular, the hillside protection standards and stormwater management requirements, as well as the subdivision regulations, may require that some lots be larger than 10,000 square feet to be able to meet all of the criteria set forth in the various standards.

All of the performance standards to which a developer would have to adhere and that were discussed in the St. Thomas study area would likewise apply to this example on St. John.

Administration of the Process

The V.I. Development Law will require a slightly different administrative approach than currently exists. Because the performance standards are somewhat complex, a site plan review process (except for single-family and two-family homes on their own lot) must be conducted before development permits are issued. The reviews for zoning compliance, as well as land development, will now be integrated into a single process.

This comprehensive review will require a trained staff, but not necessarily a new one. The Department of Planning and Natural Resources has a professional staff capable of reviewing development proposals for zoning compliance and design as well. The complexity that is created by the inclusion of the performance standards will necessitate the hiring of additional staff, however. Deadlines for the Department's determination on development permit applications as proposed in the V.I. Development Law must be stringently adhered to. Failure by the DPNR to meet the corresponding deadlines, be they major or minor, will result in the approval of the permit application. The deadlines proposed in the Law are not considered to be unrealistic and have been developed keeping in mind two factors: first, the Government must be responsive to those desiring to develop their property; second, the government must be able to perform a proper review on a development proposal effectively and efficiently. In this manner, the Comprehensive Land and Water Use Plan (and the environmental and social concerns which the Plan is based) will not be compromised.

Zoning changes in conventional systems (as presently exist in the Territory) are the rule rather than the exception. A kind of replanning and rezoning process takes over that has a life of its own. However, the reduced number of districts (from 18 to 12), along with the increased choices within the Intensity Districts, should reduced the need for many zoning change requests. The lure of big profits to be made from rezoning rural land to urban intensities will always be there, however, so zoning amendment requests may continue to be anticipated.

The most important control that can limit requests for zoning changes is the performance standards that must be considered before an amendment is granted. The developer would have to demonstrate that either population trends are sufficiently greater than initially projected, or that a specific area has received new water or sewer facilities that would justify reclassification.

Finally, it must be stated most emphatically that performance zoning is not to be used to limit growth. Rather, it is a tool to control where the growth should occur and how development should proceed to ensure a quality community.

The flow diagram that follows this discussion graphically depicts the general process that an applicant will have to follow in the future to get a development permit. It should be noted that this process applies to all development. However, single- and two-family homes will be exempted, except for those applicants wishing to build in areas subject to flooding, on extremely steep slopes, or on sites where historic or cultural artifacts are known to exist.

As was stated at the beginning of this discussion, virtually all

new development will require a site plan. This plan must address those issues that are relevant to the Performance Standards contained in the new V.I. Development Law for sites being considered for new construction.

The administrative process involves a step-by-step analysis conducted by the Permits Division staff. First, the development plan must be reviewed to determine if the use proposed is allowed in the Intensity District where the parcel is located. If it is, the next determination to be made is whether or not all of the dimensional and density requirements have been met.

Assuming that, to this point, the application has met the requirements of the Law, the next review to be conducted is one that involves the Performance Standards that would impact upon the proposed project. The review would address only those Standards relevant to the project. For example, if there are no defined floodplains on the parcel, obviously there is no need to address this issue. By the same token, enough information must be presented to the Permits Division staff so that they can determine if, in fact, the site is outside any floodplain area.

APPLICATION FOR DEVELOPMENT PERMIT

It should also be expected that the Permits Division staff will be performing the Performance Standards reviews concurrently. This will, in all probability, require the hiring of additional qualified staff. The acceptability of this new process will require that site plan reviews will be conducted in an expeditious and competent manner. If there is insufficient staff to meet this need, the process, no matter how good the underlying law that it is administering is, will fail.

Specific Staffing Requirements

The composition of the DPNR staff will have to administer the V.I. Development Law (VIDL) will have to be tailored to include individuals with the skills necessary to be able to competently and efficiently review development proposals for compliance with the performance standards. Because the performance standards compliance review is proposed to be done concurrently, the most efficient means of accomplishing this would be with review teams.

It is not necessary to have one person assigned to complete the review for one performance standard only. Certain standards are related to or have an affinity with others.

For example, performance standards dealing with environmental protection, hillside protection, management, wellfield/groundwater protection, and floodplain protection have an interrelationship with each other. The same way be said for recreation, landscaping, vegetation protection, and impervious surface standards. Residential and non-residential performance standards,

as well as those dealing with agricultural protection, signs and off-street parking/loading may be grouped together. Finally, because historic and cultural conservation is such a specialized area, it has been singled out on its own.

It is envisioned that one professional would be assigned as a reviewer for each of the groups of performance standards as discussed in the preceding paragraph. Ideally, the reviewers would have backgrounds in environmental sciences, physical or land planning, historic preservation, and community planning. They should also have at least two to three years of experience in their professional area. The professional that is needed with the physical or land planning background should have either in his/her education and/or experience with some involvement in landscape architecture, architecture, civil engineering, or have matriculated in a planning curriculum that emphasized physical planning. The Environmental Protection Division of DPNR is already charged with monitoring water quality throughout the Territory. Their role has, up to now, been one of ensuring that existing development does not degrade the environment. It would be appropriate for them to be involved in reviewing plans for new development, to ensure that the performance standards for environmental protection, stormwater management, wellfield/groundwater protection, and floodplain protection are being properly considered and met.

The community planning "generalist" should be able to deal with the residential/non-residential requirements, as well as the regulations and standards dealing with signs and off-street parking and loading. Historical and cultural conservation requirements may be reviewed by staff in the State Historic Preservation Office, a division of DPNR.

Logistics

The coordination of all reviews should be focused in the Permits Division of DPNR. Historically, this is where plans have been submitted. This is where the staff has been located to perform the reviews. This is where the individual or developer expects to go to pick up his permit(s).

There is no reason to change this focus, although initially some of the staff may not be physically located together in the same area. This is not necessarily important, as long as all members of the review team fully comprehend that they have time limits within which they must complete their reviews. For this (or any) process to be successful, the public must perceive that it is technically sound, that it is fair, and that it is being administered in an efficient manner. Even if the first two criteria are met beyond any shadow of a doubt, if the review process stretches out interminably, the public will lose faith in the process.

Therefore, a time frame has been worked out that would take approximately 21 weeks for major projects. Upon submission of an application for approval of a major project, DPNR has three weeks to determine that it is complete. Then, DPNR shall transmit copies of the application to all relevant agencies and receive their comments back, all within six weeks. Six weeks from this date, there shall be a public hearing conducted by the Coastal Zone Management Commission. Within six weeks after the public hearing, the Commission shall make a determination as to whether the project is to be approved. DPNR's review period lies within 12-week time frame, starting when copies of the application are sent to other government agencies for their comments and ending at the time of the public hearing.

Additional Staff/Financial Considerations

Over time, the Permits Division will have to add new staff in the skill areas indicated earlier in this discussion. However, budgetary constraints will probably not allow this to happen immediately. DPNR should examine their own current staff skills, as well as reviewing the demands currently made on those individuals who might be likely candidates to be on a review team.

Initially, it would appear to be appropriate to set up two review teams for St. Thomas/St. John and one for St. Croix. This would mean that up to nine major reviews, or 18 minor ones, or a number in between of a mix of majors and minors could be going on simultaneously. It is understood that much of the building activity that goes on in the Territory on a day-to-day basis is in the construction of one- and two-family homes. This type of development is not proposed to be subject to most of the performance standards.

Members of the current Comprehensive and Coastal Zone Planning (CCZP) staff have specific skills that could be employed initially on a part-time basis to begin the review team process in the most cost-effective manner possible. For example, in the Functional Planning section of CCZP there are individuals who have either an educational or professional background (or both) in urban design and environmental reviews. These skills could be put to good use in the review process, and enable the Government to utilize current staff.

This suggestion to use current staff as a "stop-gap" device to get the review teams initiated should not be read as minimizing the importance of the process. As Eric Kelly, AICP, the chairman of Iowa State University's planning department (and a planner and lawyer by training) stated in the September, 1991 issue of *Planning Magazine*: "From working with communities as a consultant, I have become convinced that what really changes the character of a place is not concepts, but what actually gets built. Those

things stay there. So do the negative things we build. That's a good reason to care about design."

If the Virgin Islands is going to improve physically, if it is going to portray itself as being a good steward of the earth (and water) that it occupies, it must have competent staff which can properly assess the impacts any new development will have. The staff will have to have the sensitivity to recognize good design and bad, and the ability to offer suggestions as to how negative impacts can be mitigated.

Having said all this, it must also be understood that the Government does not have the financial resources to full staff three full review teams of new personnel immediately. One means of generating the funds to at least offset the cost of additional staff would be to establish a fee structure for the review of the applications. The structure should be, in the cost of residential or hotel development, on the basis of the total number of units proposed to be constructed. For non-residential development, it should be based on the number of square feet proposed to be built.

This procedure is commonly used throughout the continental United States to pay for the review staffs. It is especially common to see this technique in resort- and tourism-oriented communities. Daytona Beach, Miami Beach, North Bay Village, Fort Lauderdale, Palm Beach County, Dade County, and Volusia County, Florida all use such a fee structure to defray the cost of their review staffs. Additionally, several municipalities and counties in California and Colorado use a similar technique.

With the framework of the present pay-scales of DPNR's professional staff, a salary of \$_____ should be expected to be paid for a landscape architect with a Bachelor of Science degree with two to three years of experience. A planner with a strong academic and/or professional background in urban design or site planning with two to three years of practical experience would command a salary of \$_____. DPNR will probably have to hire four individuals with either of these types of backgrounds. While it would be most helpful in the review process to have an individual with a landscape architecture background, it is recommended that no more than one person with these skills be retained. This suggestion is made because there may be periods when there are few projects that are being reviewed. Generally, those individuals with the planning background will be able to perform other planning tasks more efficiently than a landscape architect, simply because of his or her background and training.

APPENDICES

APPENDIX A

Relevant Excerpts From Guidelines For The Development of a Long-Range Comprehensive Plan For The United States Virgin Islands.

GOAL: Achieve a quality living environment through a well-planned mix of compatible land and water uses, while preserving the integrity of the natural environment.

Objective A

Establish a system for the effective management and utilization of land resources.

Strategies:

1. Develop a comprehensive land and water use plan.
2. Permit granting and regulatory decisions for the land and water development projects should be consistent with the Territory's long range land use goals and objectives.
3. All development shall be monitored for conformance to applicable environmental land and water use laws, which shall be consistently applied to all projects.
4. Proposed development projects, public and private, requiring environmental impact statements shall be reviewed with cumulative effects taken into consideration.
5. Publicly owned land should be managed in accordance with standards for disposition, development, and use consistent with the long range land use goals and objectives of the Territory.
6. The regulations for development projects must be published, and all projects consistently inspected to ensure compliance with, as well as enforcement of, public regulations.

Objective B

Preserve and conserve land resources for economic, social and community uses.

Strategies:

1. Emphasize consideration of future as well a current land use needs when making zoning change decisions.
2. Base government acquisition of land upon a prioritized program designed to meet the

- current as well as future needs of Virgin Islands society.
3. Prioritize and reserve coastal area for water dependent uses, where possible, including aquaculture and agriculture.
 4. Protect and preserve area with visual quality, historic, recreational, and wildlife significance.
 5. Protect and preserve area suitable for agricultural production.

Objective C

Achieve a pattern and intensity of development which best utilizes land resources.

Strategies:

1. New physical developments should use energy efficient design and technologies, and be aesthetically and culturally sensitive to their surroundings.
2. New public and private residential developments should include land reserved for customary and associated public facilities and community-use needs.
3. New public and private residential developments should include consideration for traditional community use needs.
4. Planned developments should allow for variable densities for a mix of uses which are compatible in residential area.
5. Promote the dedication or acquisition of frequently flooded areas to be used as open space.
6. Determine development types and mix that are most suitable to the ideal density for the area.
7. Cluster housing and planned area development techniques should be used to conserve open space and protect environmentally sensitive areas.
8. New development and renewal projects should utilize energy efficient design and technologies.
9. Develop guidelines for layout of subdivisions for placement of access roads, groundcover, trees and other vegetation.
10. Establish control for density and design of subdivisions.
11. Achieve a pattern of development that mitigates erosion and seismic hazards.

12. Major private projects outside existing communities must provide a share of the cost for infrastructure improvements and expansion which includes roads, power, waste disposal and other public facilities.

Objective D

Achieve, through preservation, conservation and redevelopment practices, an enhancement of the positive qualities and character of established communities in the Virgin Islands.

Strategies:

1. New development or alterations to existing structures shall continue to conserve and enhance neighborhood quality, historic integrity, and cultural sensitivity.
2. Run-down area should be designated as target for concentrated public action and joint public/private investments to improve physical conditions while preserving existing uses as much as possible.
3. Historic preservation of physical areas and structures should be encouraged through the creative use of zoning, taxes, and other public incentive programs.
4. Long term planning for land and water resources should be for the advantage and positive growth of all Virgin Islanders and not just a few.
5. Expand the historic district boundaries to include Cruz Bay, St. John; Frederiksted, St. Croix; and a greater portion of Charlotte Amalie, St. Thomas.

Other Elements of the Policy Guidelines that provide direction for the development of the Comprehensive Land and Water Use Plan for the Territory include Natural Resources, Agriculture, Population, Recreation, Economic Development, Water Resources, Transportation, Solid and Liquid Waste, and Energy.

The goals and objectives for these elements, as stated in the "Guidelines for the Development of a Long Range Comprehensive Plan" are as follows:

NATURAL RESOURCES

Goal: Protect , preserve, and restore the natural environment of the Virgin Islands.

Objective A

Ensure the protection and wise use of the natural resources of the Virgin Islands.

Objective B

Conserve and protect the natural environment from human-induced degradation.

Objective C

Conserve areas significant for their contribution to aesthetic enjoyment, productivity, and value as habitats for rare and endangered species.

Objective D

Conserve, protect, and utilize most carefully the surface, marine and ground waters of the Virgin Islands.

Objective E

Develop greater public use, awareness, and appreciation of the Virgin Islands' natural resources.

AGRICULTURE

Goal: Achieve a higher degree of agricultural self-sufficiency in the Virgin Islands.

Objective A

Preserve and manage land suitability for long-term agricultural use.

Objective B

Assure a self-sufficiency supply of labor, capital, and support services to strengthen entrepreneurship in agriculture.

Objective C

Increase agricultural production in area where the Virgin Islands has comparative advantage.

POPULATION

Goal: Achieve a population size and geographic distribution which is consistent with social, economic and physical capabilities of the Territory, and reflects the desired qualities of life.

Objective A

Achieve a high degree of understanding of the Territory's carrying capacity as it relates to population growth.

Objective B

Achieve efficient and socially acceptable long-range geographic distribution and stability of the Virgin Islands' population.

Objective C

Work to create a better balance between economic growth and the Territory's ability to provide manpower.

RECREATION

Goals: Provide opportunity for a wide variety of leisure time activities.

Objective A

Provide recreation services to help improve the mental and physical health of the people of the Virgin Islands.

Objective B

Assure the preservation of recreational, natural, and historical resources and promote appreciation for these resources through programs that increase knowledge and understanding of their importance.

Objective C

Inform residents and visitors about recreational activities.

Objective D

Support programs that will help foster private

recreation enterprises and volunteer efforts to enhance the contribution of recreation services to the Territory's economy and quality of life.

Objective E

Develop a Territorial Park System to safeguard and enhance the land and marine environment of the Virgin Islands.

ECONOMIC DEVELOPMENT

Goal: Achieve a stable, diversified, and well balanced Territorial economy.

OBJECTIVE A

Stimulate local control and participation in the commerce and manufacturing sectors.

Objective B

Assure that economic growth is sensitive to social and environmental quality objectives.

WATER RESOURCES

Goal: Achieve fulfillment of both water quality and quantity needs in the Virgin Islands.

Objective A

Develop efficient, cost effective, and equitable water supply, storage and distribution systems for all water usage classifications in the Territory.

Objective B

Ensure high quality drinking water.

Objective C

Achieve a high level of drinking water conservation education programs that will increase public awareness of the issues surrounding the production and the use of water.

TRANSPORTATION

Goal: Achieve a reliable transportation system that promotes safe, energy efficient, convenient, affordable, and efficient movement of people and goods.

Objective A

Maintain, improve, and expand air, sea, and land transportation facilities to effectively accommodate persons, businesses, and goods.

Objective B

Reduce the need for, and the use of, the private automobile.

Objective C

Develop an accessible, well-routed transportation system which is responsible to the needs of the community and in harmony with the natural environment.

SOLID AND LIQUID WASTE

Goal: Achieve a sound system of waste disposal to support basic public health and environmental standards.

Objective A

Establish a trash reduction program.

Objective B

Develop, maintain, and regulate effective solid, liquid and hazardous waste collection and disposal systems.

Objective C

Utilize sound planning in the siting, maintenance, and regulation of wastewater treatment systems.

ENERGY

Goal: Secure a sound and affordable energy future for the Territory.

Objective A

Develop plans and implement activities that foster maximum energy self-sufficiency.

Objective B

Provide for the efficient and reliable generation, transmission, and distribution of energy resources.

Objective C

Develop systems for Territorial energy management.

APPENDIX B

Areas of Particular Concern

St. Croix

(1) Christiansted Waterfront

- (a) Fort Christiansvaern to Vicinity of Seaplane facilities

Christiansted is the largest urban area on St. Croix and is also an important commercial center. Most of the town is included in the historic district and several notable landmarks are situated along the waterfront. The Christiansted National Historic Site includes Fort Christiansvaern, the Scalehouse and surrounding areas, and Government House.

A number of hotels and tourist related shops are located in the downtown area. The development pattern along the waterfront has resulted in poor lateral access to many areas of the shoreline. Waterfront access is primarily by means of numerous small alleyways which lead directly to the shore with movement hindering or even blocked by buildings and fences. There are several small finger piers along the waterfront and the harbor is heavily used for small boat mooring and anchorage.

Downtown vehicular congestion and lack of adequate parking space are problem in the area and are impediments to the waterfront redevelopment. The removal of heavy cargo traffic from the Gallows Bay Port to the Southshore Container Port has decreased this traffic congestion somewhat; however, other Gallows Bay Port activities have increased which contribute to the vehicular congestion problem. Shoreline parking surrounding the Scalehouse and Hamilton Jackson Park restricts the pedestrian movement and remains incompatible with the scenic character of the National Historic Site. Alternative parking schemes and sites must be devised to remedy this situation.

Water quality in Christiansted Harbor has been degraded by numerous dredging activities, urban runoff, and sewage and oil discharges. A well-developed fringing reef system which defines the harbor, has been, and continues to be, under severe stress. Untreated sewage discharges into the adjacent coastal waters have continued despite the completion of the Christiansted

interceptor system. Point source discharges continue from live-aboard vessels in the harbor. Water turbidity has increased due to continued dredging activities by the Port Authority to deepen the Schooner Channel for cruise ship traffic. Terrestrial runoff into Christiansted Harbor has increased due to upland development and channelization of watershed drainage ways. In addition to catastrophic damage inflicted on St. Croix by the direct impact of Hurricane Hugo on September 17 and 18, 1989, thousands of gallons of diesel fuels were released into Christiansted Harbor from storm-related damage to the V.I. Water and Power Authority's Estate Richmond power generation/fuel storage facility.

Protestant Cay, located just 500 feet offshore of Fort Christiansvaern, is an important element of Christiansted Harbor. Although the Cay is only five acres in size, it adds significant visual interest to the view from the Christiansted Waterfront. The Government of the Virgin Islands owns Protestant Cay. A private company holds the lease and operates a resort hotel on the Cay. Ferry service is provided for a fee between Christiansted and the hotel on the Cay. An endangered species of lizard, *Ameiva polops*, is found only on Protestant Cay and Green Cay. Protestant Cay is listed as critical habitat under the Federal Endangered Species Act.

(b) Fort Louise Augusta - Altona Lagoon - Gallows Bay

This area is just east of the Christiansted downtown district, extending from Fort Christiansvaern eastward to the vicinity of Fort Louise Augusta. It includes the Gallows Bay Port and marina facilities and the filled land adjacent to the Altona Lagoon.

With the opening of the Port Authority's container port facilities in 1976, all containership traffic, once handled in Gallows Bay, has been rerouted to the southshore facility. The limited Port Authority facilities at Gallows Bay handles a significant amount of maritime commerce of small inter-island freighters, local and visiting commercial fishing vessels and vessels under contract to the U.S. Navy. This area also contains Christiansted's only marina, St. Croix Marine, with dockside facilities for recreational, and military vessels up to 300 tons. Gallows Bay has traditionally been a fishing community and its shoreline is used for small boat mooring, boat repairs, and the sale of fish.

Altona lagoon is connected to the sea by a small channel located just east of St. Croix Marine. Altona Lagoon is fringed by a well-developed mangrove system that provides important habitat for numerous birds, fish, shrimp, and shellfish species. The drainage and circulation of the Lagoon is poor due to the artificial reduction of the channel width over the years by the creation of fast land. Altona Beach, the filled land adjacent to the Lagoon, has been partially developed for recreation; however, it does not receive heavy use except for special holidays and larger scale gatherings. The Department of Housing, Parks and Recreation plans to renourish shoreline sediments lost by erosion and upgrade existing facilities damaged by Hurricane Hugo. Altona Lagoon is also the site of a heavily used public boat launch ramp, the only facility that provides safe access to offshore waters from the north coast of St. Croix. The Department of Planning and Natural Resources will upgrade this facility with Department of the Interior funds to extend the existing ramp seaward, construct a small pier and a second ramp, and create adequate turnaround and vehicle/trailer parking.

(c) Western Christiansted Harbor

This large area of undeveloped filled land extends westward from the seaplane facilities to the V.I. Water and Power Authority Plant. Much of the adjacent inland area is occupied by Housing Authority developments, including JFK Terrace, DeChabert, and Watergut Homes. At present, few recreational facilities are available for nearby residents. Plans for a "Christiansted West Waterfront Park" by the former Department of Conservation and Cultural Affairs, which were to include extensive land and water recreational activities (bicycle path, pedestrian boardwalk, swimming areas, boating, tennis, basketball courts and play fields), remain unfinalized and shoreline rehabilitation is needed.

(2) Southgate Pond - Cheney Bay

Southgate Pond has been divided by fill to form two separate ponds. The western portion was opened to the sea and extensively modified by dredge and fill operations in 1980 to create a 140 slip marina (Green Cay Marina). The eastern larger pond is fringed by a well-developed mangrove community and is an important wildlife habitat, scenic, and educational area. Proposed development in the fragile baymouth bar,

fronting the undeveloped eastern half of Southgate Pond, threatens the value of this area as habitat for local and federally listed wildlife and sea turtle species. Cheney Bay Beach is located between the sea and the eastern pond. In addition to affording fine views of Green Cay, this area serves as important nesting habitat for three species of federally endangered sea turtles. Because of its proximity to Christiansted, Cheney Bay Beach has potential for increased public recreational use. Southgate Pond and Cheney Bay Beach are recommended to be included in a Territorial Park System.

(3) St. Croix Coral Reef System

The best example of coral reefs in the U.S. Virgin islands is found offshore of St. Croix. These reefs are areas of high marine productivity, supporting the traditional reef fish/lobster fisheries, and provide spectacular opportunities for underwater recreation. The bank-barrier reefs, which extend along the entire northeastern and southeastern coasts, are the most extensive and developed of all the St. Croix reefs and, as such, deserve special management. Fine examples of algal ridges can also be found within this area of particular concern. Algal ridges are important sources of nutrients to coastal waters. Clear water that enables maximum penetration of sunlight is essential for the development of coral reefs and algal ridges. On the usual northwest shore, the sea floor drops off abruptly, producing an unusual type of reef system. The deep reefs between Cane Bay and Davis Bay are the best examples of this marine environment in the U.S. Virgin Islands. The Coral Reef APC extends from Long Reef off Christiansted Harbor eastward to include the non-federal areas of Buck Island reef, Coakley Bay-Teague Bay-Boiler Bay reefs to East Point and the southeastern reefs from East point to the west end of the Great Pond Bay. Also included are the well-developed algal ridges off the southeast shore and the deep reefs between Cane and Davis Bays.

(4) East End

This APC includes the area on the northeast coast from Cramer Park to Point Udall, the easternmost point of the Virgin Islands, then westward along the southeast coast to include Jack and Isaacs Bays. Cramer Park is the most popular public beach recreational facility on St. Croix. Located adjacent to Cramer park and south of the East End Road is the National Radio Astronomy Observatory's very long baseline array radiowave

telescope facility. Recommendations to preserve and manage the East End areas and to designate it as a part of a territorial park system were made as early as 1960, and as recently as 1991. East End has the driest environment of St. Croix and, as such, is an excellent example of the thorn-scrub ecosystem. Likewise, Point Udall is a matchless example of dwarf vegetation due to salt spray and wind shear. The ecology of the East End, because of its dryness, steep slopes, soil type and proximity to wind, and salt spray from the sea, is extremely sensitive to disruption. Jack and Isaacs Bay Beaches are isolated and virgin. Water quality in both bays is considered pristine. The well developed fringing coral reef systems offshore make Jack and Isaacs Bays one of the best snorkeling spots in the Virgin Islands. The federally endangered green, hawksbill, and leatherback sea turtles nest on Jack and Isaacs Bay Beaches. Jack Bay Beach has been recorded as the most important hawksbill turtle nesting beach in the U.S. Virgin Islands. The East End is presently owned by the Virgin Islands Government and CaribBank Financial Group. The U.S. Navy leases 4.453 acres at the top of Sugarloaf Hill. A proposed major subdivision development of Jack and Isaacs Bays by CaribBank Financial Group would severely alter this fragile environment. Jack and Isaacs Bays are recommended to be included in a Territorial Park System.

(5) Great Salt Pond and Bay

Great Salt Pond is the second largest salt pond in the Virgin Islands, with black mangroves fringing most of the Pond. In addition to serving as a large sediment trap between upland areas and Great Pond Bay, Great Pond is a significant wildlife area and the most important bird habitat on St. Croix. The bank-barrier reef offshore affords protected back reef waters for extensive turtle grass meadows. The proximity and relationship of these three natural systems makes the Great Salt Pond and Bay a unique natural area. Great Salt Pond is recommended to be included in a Territorial Park system.

(6) South Shore Industrial Area

The industrial area extends from Canegarden Bay to Manning Bay, just south of the Hamilton Airport. The shoreline and adjacent inland areas are among the most heavily developed in the Virgin Islands. Massive dredge and fill activities have occurred throughout most of this area. These developments include:

(a) Hess Oil Virgin Islands Corporation
(HOVIC)

The 545,000 barrel per day refinery on St. Croix is one of the largest in the world, encompassing 1,200 acres. The HOVIC port facilities are extensive and large enough to accommodate all conventional oil tankers. Very large crude carriers (VLCC-tankers larger than 200,000 DWT) use the port after being lightened in St. Lucia. HOVIC is presently negotiating for 300 acres of land adjacent to the eastern property boundary belonging to the University of the Virgin Islands (formerly Virgin Islands Refinery Corporation - VIRCO - property).

(b) Virgin Islands Commercial Port
Facilities

HOVIC constructed commercial port facilities for the Virgin Islands Government in 1976 for containership cargo between HOVIC and the Martin Marietta Alumina Plant (now Virgin Islands Alumina Corporation - VIALCO) in 1981.

(c) Virgin Islands Port Authority
Container Port

The Container Port, situated between HOVIC and VIALCO, is located along the South Shore in close proximity to the Alexander Hamilton Airport and private industrial parks. An immense amount of the maritime commerce for St. Croix is handled at the Container Port, which is adjacent to the four-lane Melvin Evans Highway. The facilities handle both lift-off and roll-on/roll-off cargo simultaneously. The length of the dock measures 1,200 feet and can sufficiently handle vessels with a draft of 35 feet. It is equipped with a 30-ton gantry crane and 30,000 square feet of warehouse and open storage space.

(d) Virgin Islands Port Authority
Krause Lagoon Dock

The new molasses and break bulk docking facilities are presently being built at

Krause Lagoon, located due south of VIALCO. The dock is proposed to accommodate molasses tankers of 500 feet of overall length. The facilities will be port for cargo vessels transporting molasses for the rum factories well as liquid asphalt. Additionally, the facilities are designed to handle other cargo by roll-on/roll-off.

(e) St. Croix Landfill

The Department of Public Works operates a sanitary landfill just west of the VIALCO property. The new landfill is located inland immediately north of the previously used coastal site. A Government abattoir was previously situated nearby.

(f) Wastewater Treatment Plant

A large wastewater treatment plant with ocean outfall is located near the sanitary landfill. Almost all wastewater flows from Christiansted and Frederiksted is treated at this plant. Rum plant effluent is also discharged into the sewer line. Sewer discharges periodically occur into Fair Plain Gut.

(g) Flamboyant Racetrack

The Racetrack is located west of the landfill and wastewater treatment plant. The track is just south of the Airport and occupies much of a large parcel of Government land which extends from the Airport south to Manning Bay. The mangrove shoreline in this areas is still healthy and productive.

(h) Texaco Storage Facility

Texaco occupies a land-based storage facility/tank farm at Estate Betty's Hope at the western end of Manning Bay. Offshore unloading facilities are no longer in use.

(i) Virgin Islands Rum Industries

The Virgin Islands Rum Industries plant located in Estate Diamond has an effluent pipeline that parallels the West Airport Road and discharges into offshore waters of the

Texaco facility.

There are numerous potential adverse environmental impacts associated with the entire Southshore Industrial Area. The foremost among these is the potential for large scale oil spills along the entire south shore. The volume of petroleum products which are presently being transported, loaded, and unloaded in this area is immense. Regardless of the safety precautions that are taken, an element of risk is always present for these operations. Other adverse impacts include degradation of water quality, which results from the massive alteration of drainage patterns, both in the immediate area of development and also runoff problems associated with upland development. Another potential problem for the areas is that of waste discharge, including chemical and thermal wastes from the industrial plants, the sewage treatment plant and the solid waste disposal site. The mangrove areas near VIALCO and Manning Bay are also vulnerable to adverse industrial impacts.

(7) Sandy Point

Sandy Point is a peninsula of approximately 500 acres at the southwest tip of St. Croix and has been designated a National Wildlife Refuge since 1984. Within Sandy Point are located the largest salt pond in the Virgin Islands (West End Salt Pond) and the longest stretch of beaches in the Virgin Islands. The beaches at Sandy Point are traditionally popular recreational areas and important nesting sites for three species of federal endangered sea turtles. A 0.8 mile stretch of beach at Sandy Point is the only known beach under U.S. jurisdiction used extensively for nesting by the endangered leatherback sea turtle. In 1977, this portion of Sandy Point, 0.8 mile long by 1.0 mile wide, was declared as emergency critical habitat for the U.S. Fish and Wildlife Service. The National Marine Fisheries Service designated adjacent waters to a depth of 100 fathoms also as critical habitat. In 1984, the U.S. Fish and Wildlife Service purchased 300 acres of Sandy Point, which includes half of the Salt Pond, from West Indies Investment Company and established the Sandy Point Wildlife Refuge.

(8) Frederiksted

The commercial importance of the town of Frederiksted fluctuates proportional to the amount of cruise ship/tourist activity St. Croix receives. Prior to Hurricane Hugo in September, 1989, cruise ship activity was approximately two to three cruise ships per week. Cruise ship accommodations consist of one large finger pier capable of handling two vessels. Frederiksted Harbor is an open roadstead vulnerable to wave assault from the westerly quadrant. Military vessels and other commercial ships also use the Frederiksted Pier. The V.I. Port Authority plans to construct a new pier to replace the hurricane-damaged one, and will be located north of the existing structure. The downtown waterfront areas is not heavily used and most of the shoreline here is occupied by park area and Fort Frederik, a National Historic Site. In addition, much of the town itself is included in the Historic District. Pleasure craft anchor offshore in the harbor to enjoy the calm "lee" conditions created from easterly tradewinds. Severe damage to the coral reef ecosystems has occurred off Frederiksted due to large commercial and military vessels anchoring offshore.

(9) Salt River - Sugar Bay - Triton Bay

Salt River is one of the few major mangrove lagoons remaining in the U.S. Virgin Islands. It is the largest in St. Croix, containing nearly 45 acres of white and black mangrove along the shoreline. Salt River is an important habitat for many species of fish and crustaceans, birds, and terrestrial wildlife. Studies conducted by the Division of Fish and Wildlife clearly show that the fringing red mangrove prop roots provide critical habitat for juvenile reef fish species, such as snapper and grunt, and spiny lobster. Those species represent important components of inshore commercial fishery operations. Salt River Bay and its surrounding areas support the highest diversity of bird-life known in the Virgin Islands. The mangrove forests are critical habitats for migrating and wintering North American landbirds. Many species nest here, include the endangered white-crowned pigeon. Seventeen of 108 species found in Salt River are locally endangered, while three are federally endangered, including the Brown Pelican, Peregrine Falcon, and Roseate Tern. In 1965, the Nature Conservancy established a 12.5 acre wildlife sanctuary in Triton Bay. Three species of federally endangered sea turtles are also found within the Salt River embayment.

Salt River also has important scientific, educational, and cultural values. It comprises an important ecosystem continuum of upland watersheds, mangrove wetlands, seagrass beds, coral reefs, and offshore submarine canyons not found anywhere else in the U.S. Virgin Islands. For more than ten years, Fairleigh Dickinson University maintained an important underwater research station here, funded by the National Undersea Research Center, to support scientific investigations of the mangrove - seagrass - coral reef and submarine canyon interrelationships. The protected inner lagoon waters of Salt River serve as a natural hurricane hole for boats during storms. Permanent mooring facilities for vessels in Salt River is provided by the Salt River Marina on the embayment's western shoreline. Shoreline alterations on the eastern side of Salt River (dredging, filling, and bulkheading) are the result of a second marina project in the late 1960s abandoned due to illegal occupation of reclaimed submerged land. In addition to boating, recreational activities in Salt River include fishing, bathing, snorkeling, diving, sailboarding, and surfing.

Salt River is of major historical and archeological significance. The northwest side of Salt River is a National Historic Site, commemorating the first and best documented site where Christopher Columbus landed on his second voyage in 1493. The east side of Salt River was named Cabo de las Flechas or Cape of Arrows by Columbus, following the first violent encounter with West Indians. In 1965, the Virgin Islands Government established a five acre Territorial Park in the area which also includes the site of aboriginal artifacts and remains dating from 350 A.D., including a prehistoric village, a ceremonial center/ball court, and a 16th century fort. Salt River, Sugar Bay, and Triton Bay are recommended to be included in a Territorial Park System.

St. Thomas

- (1) Charlotte Amalie Harbor and Waterfront
 - (a) West Indian Company and Vicinity

The area in the vicinity of the West Indian Company dock is one of the most heavily used areas of the St. Thomas waterfront. The Company's properties include the most extensive passenger and cargo handling facilities in the Virgin Islands. The docks

provide complete service for cruise ships, cargo vessels, fuel tankers, and an occasional military vessel. In 1990, the docks were extended to provide docking spaces up to an average of 4 cruise ships. A large marina and numerous small boat mooring are located adjacent to the dock area.

Because of the great number of cruise ships that normally call at St. Thomas, the West Indian Company (WICO) and vicinity docks frequently are unable to accommodate all of the vessels requiring services. Cruise ships that cannot be accommodated at the dock are anchored in the outer Harbor. Efforts should be made to discourage this practice, which creates congestion in the Harbor, and ships should be encouraged to dock at the Crown Bay Marine facilities.

In 1987, 7.5 acres of the harbor were filled by WICO over the objections of the Virgin Islands community. A large commercial/hotel resort/marina has been proposed for the area.

The marina adjacent to the WICO docks is large and equipped for both sailing vessels and larger power boats. A resort hotel, gift shops, a restaurant, and a night club are located near the marina operation. A number of vessels at the marina and adjacent mooring sites serve as permanent live-in facilities.

(b) Long Bay and Downtown Waterfront

The waterfront area which extends from Paul M. Pearson Gardens to the inter-island ferry and airboat facilities near Frenchtown is used primarily for recreation and traditional commerce. This area also includes Veteran's Drive, the major thoroughfare for downtown Charlotte Amalie. The docking facilities near the Legislature Building have long been used by the local fishermen for mooring and boat repair. The small island trading vessels are the principal users of the bulkhead area along the downtown waterfront. These activities play an important role in the day-to day commercial and cultural life of the islands. The bulkhead area also receives considerable use by private yachts and tour boats. Because of traffic

congestion, continued safe public access to the waterfront is threatened. Both residents and visitors often experience difficulty in crossing Veteran's Drive to reach the island trading vessels and other waterfront markets and activities. There is a study that proposes the filling of the Waterfront to provide additional traffic lanes for Veteran's Drive.

(c) Frenchtown and Vicinity

The waterfront area from the inter-island ferry and U.S. Customs facilities to Frenchtown is used for transportation services, traditional fishing and boating activities, and for marina facilities. Most of the available shoreline is presently developed. In addition, the marine areas receive very heavy use and are stressed by considerable runoff from upland areas. The marina areas here is often congested. The narrow channel at Haulover Cut represents a potential safety hazard to both boat traffic and incoming airboats.

(d) Crown Bay

The Crown Bay area, extending from near Cancryn School to the former submarine base piers, is among the most heavily developed areas of the St. Thomas waterfront. The shoreline uses in this areas range from container ship facilities to marina and cruise ship docking facilities. The sand-fill area south of Adelita Cancryn School receives heavy use from shallow draft container vessels and bulk carriers and also serves as a beaching area for local fishermen. The Sub-base area activities include warehousing and restaurants. A small marina and cargo/vessel servicing facility have been developed but are under utilized. The pier is used mainly for the highly developed shoreline. Most other areas of the former Naval Base are presently occupied by private concerns which lease from the Government.

(e) Krum Bay

The Water and Power Authority electric

generation and desalinization plants occupy much of the Krum Bay shoreline. Bulk materials, such as sand and fuel, are also unloaded and stored here. All of the available shoreline is presently developed and much of the surrounding hillside is used for fuel and water storage tanks. Much of the Northeast section of Krum Bay is littered with derelict barges and other marine equipment that have been dumped or abandoned. DPNR has plans to remove much of the debris and develop a marina facility for government vessels and a storage area.

(f) Hassel Island

Hassel Island is a small offshore island (139 acres) which has historic, recreational, and scenic value. Because of its close proximity to Charlotte Amalie (150 feet across Haulover Cut), Hassel Island's development potential is high. Presently, the island serves to preserve the visual integrity of St. Thomas Harbor. The maintenance of Hassel Island in its present state is essential to the preservation and enhancement of the visual quality and character of the Harbor. The southernmost third of the island (48 acres) is already a historic district on the National Register of Historic Places. The island is owned by the Federal Government and is administered between the NPS, Department of Education and DPNR to establish a coordinated approach to develop marine training facilities on the island.

(g) Water Island

Water Island, southwest of the entrance to St. Thomas Harbor, is the fourth largest island in the Territory (500 acres). The island is owned by the Federal but is currently being leased to Water Island, Inc. The lease expires in December, 1992.

Based upon the findings of the Federal consultation-coordination element of the program, it does not appear that the island includes an existing or proposed "national interest" nor is there any existing or proposed "national defense" use for the area. Scattered development has occurred,

including hotels and private homes. The official position of the V.I. Government is when the lease expires in 1992, the island should be transferred to the V.I. Government and thereafter, all Territorial laws will apply.

(2) Estate Botany Bay

This area is located at the western end of St. Thomas and includes the marine resources of Botany and Sandy Bays.

Within the 400 acres of Estate Botany Bay are an unusual combination of historic, natural, recreation, and scenic resources. An archaeological district containing the remains of an Arawak village, a historic mill, and sugar factory have been placed on the National Register of Historic Places. A wildlife sanctuary and arboretum are additional features of note within the site. The marine life of Botany Bay and Sandy Bay is partially rich, with good examples of sponges, corals, and fish. At present, Estate Botany Bay is privately owned. The Estate and associated marine resources have been recommended as a "national natural landmark." The area has been the subject of some development proposals.

(3) Magens Bay

Magens Bay is the most distinctive coastal feature on the north shore of St. Thomas. As one of the largest bays in the Virgin Islands (4,000 feet wide and over two miles long), it is also one of the most significant recreational resources of St Thomas. The entire vista is one of the most scenic in the Virgin Islands.

Beyond the beach itself, the area that has a concentration of several resources that make the entire watershed one of the highest-value resource areas in the Territory. There exists an archaeological site that is on the National Register of Historic Places. This site is of considerable cultural and educational value to the people of the islands. An arboretum of extensive tropical flora also exists beyond the beach area.

Almost any place leaves an "image" with its residents and visitors. The "image" of St. Thomas for many people is summed up by the view of Magens Bay from the observation points at Mountain Top and Drake's Seat. Therefore, as the factors outlined indicate, Magens Bay

is a resource worthy of special management.

The water quality in the Bay has degraded as a result of silt from a major subdivision at Estate Peterborg.

(4) Mandahl Bay

The salt pond at Mandahl Bay was opened as part of a plan to develop the Bay as a marina and Hans Lollick Island as a resort. The project was abandoned, leaving a massive rip-rap break at the opening to the proposed mooring and docking areas, and some initial site preparation. Water swells, high-energy wave action, dangerous sailing, and inaccessible location preclude the future use of this area as a marina. The plan to develop Hans Lollick Island has been revived. A CZM permit for development is expected to be submitted in 1992.

At the present time, the site is functioning as an excellent wildlife area. Sea birds and fish are very common. Possibilities for restoration have been assessed by the U.S. Fish and Wildlife Service. The site is presently owned by the Government of the Virgin Islands.

(5) Vessup Bay - East End

Vessup Bay functions as the focal point of the entire east end of the island. Commercial development, such as the new Red Hook shopping center, numerous marina developments, Eudora Kean High School, and the Red Hook-Cruz Bay ferry dock are all located in or adjacent to Vessup Bay. Many hotels and condominiums are also located on the east end of St. Thomas.

Because of its proximity to the excellent sailing areas of St. John, the British Virgin Islands, and Sir Francis Drake's Passage, Vessup Bay is a site of intense boating activity. As a result, the Bay is quickly becoming overcrowded. The marinas are filled to capacity and the mooring of sailing vessels utilizes a substantial portions of the deeper water of the Bay.

The Red Hook-Cruz Bay ferry dock on the north side of the Bay and the National Park Service dock on the south side add significantly to its heavy use. The concomitant problems of safety, reduced water quality, and lowered visual quality are evident.

(6) Jersey Bay: Mangrove Lagoon/Benner Bay

Mangrove Lagoon/Benner Bay comprise a complex section

of the coastal zone of southeast St. Thomas. The mangrove Lagoon is the last stand of Mangrove ecosystem on the island. Benner Bay, directly east of the Lagoon, is an areas of very important marina activity.

There are many land and water use conflicts which affect the ecological ability of the mangrove system. The Turpentine Run Sewage Treatment Plant frequently malfunctions and dumps raw sewage into the Lagoon. The DPW has received a CZM permit for a wastewater treatment facility that would intercept and treat waste from five East End treatment plants.

The construction of the Clinton Phipps Racetrack resulted in the clearing of many mangroves, thus, reducing the function of the mangrove ecosystem.

The Bovoni Landfill has long exceeded its capacity and there are presently no plans for the creation of a new landfill. Leachate from the landfill negatively impacts on the water quality of the mangrove lagoon.

The demand for docking facilities has, in part, encouraged piecemeal illegal destruction of sections of the mangrove fringe. Mangroves are hacked away, and fill is added to create small private docks and piers. Where the water is shallow, propeller backwash (blow-out) is utilized to dredge the bottom.

The basic issue in the areas is the need to reconcile and harmonize the apparently conflicting goals of protecting a healthy mangrove ecosystem while encouraging the existence of the vital marine industry of Benner Bay.

St. John

(1) Enighed Pond - Cruz Bay

Cruz Bay is the major residential center and port of entry for St. John. A CZM permit has been approved by the VIPA to improve and develop the Enighed Pond - Cruz Bay area. the permit allows for the development of a marina, dry boat storage facility, and facilities for bulk materials.

Little Cruz Bay is presently used as the Island's cargo loading and unloading area. The development of Enighed Pond would remove cargo activity from this area and a ferry docking facility will replace these activities. Cruz Bay can then be restored to its original use as a recreational beach.

(2) Chocolate Hole - Great Cruz Bay

Chocolate Hole and Great Cruz Bay are located on the southwest coast of St. John. The two areas are both significant natural areas and are subject to strong development pressure. Water quality in both areas is subject to degradation from surrounding residential developments. Great Cruz Bay has already been adversely impacted by these developmental activities. For example, a major hotel resort/marina has been developed in the Great Cruz Bay area and construction is underway for development of another resort at Chocolate Hole.

(3) Lagoon Point - Coral Bay

Coral Bay is the population center for the East End of St. John.

Although more than one half of St. John's land area is owned by the National Park Service, there is still a need to protect significant natural areas outside of the Park's boundary. Lagoon Point and its associated coastal and marine resources is such an area. Located in Coral Bay, east of Calabash Boom, Lagoon Point is a resource complex of immeasurable wealth. In a small area, consisting of 150 acres, Lagoon Point concentrates fine examples of the lagoon and salt pond ecosystem which can be easily observed. Fishing, swimming, and snorkeling can be enjoyed at Friis Bay, within Lagoon Point. An additional asset of this site is its function as a living classroom that illustrates some basic lessons in Virgin Islands ecology. Lagoon Point is an excellent example of the "classical Caribbean fringing reef" and has been recommended for inclusion in the registry of Natural Landmarks. The Department of Planning and Natural Resources has designated 140 acres of submerged land as "The Lagoon Point Territorial Reef Reserve." Both the marine resources and the adjacent land area are planned for inclusion in the Territorial Park system.

APPENDIX C

Comparative Matrices of Uses in Current and Proposed Zoning Districts.

BIBLIOGRAPHY